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Western Mining in the Twentieth Century
Oral History Series

James Boyd
MINERALS AND CRITICAL MATERIALS MANAGEMENT
MILITARY AND GOVERNMENT ADMINISTRATOR
AND MINING EXECUTIVE, 1941-1987

With Introductions by
Simon D. Strauss
G. Frank Joklik
James K. Richardson

An Interview Conducted by
Eleanor Swent
in 1986

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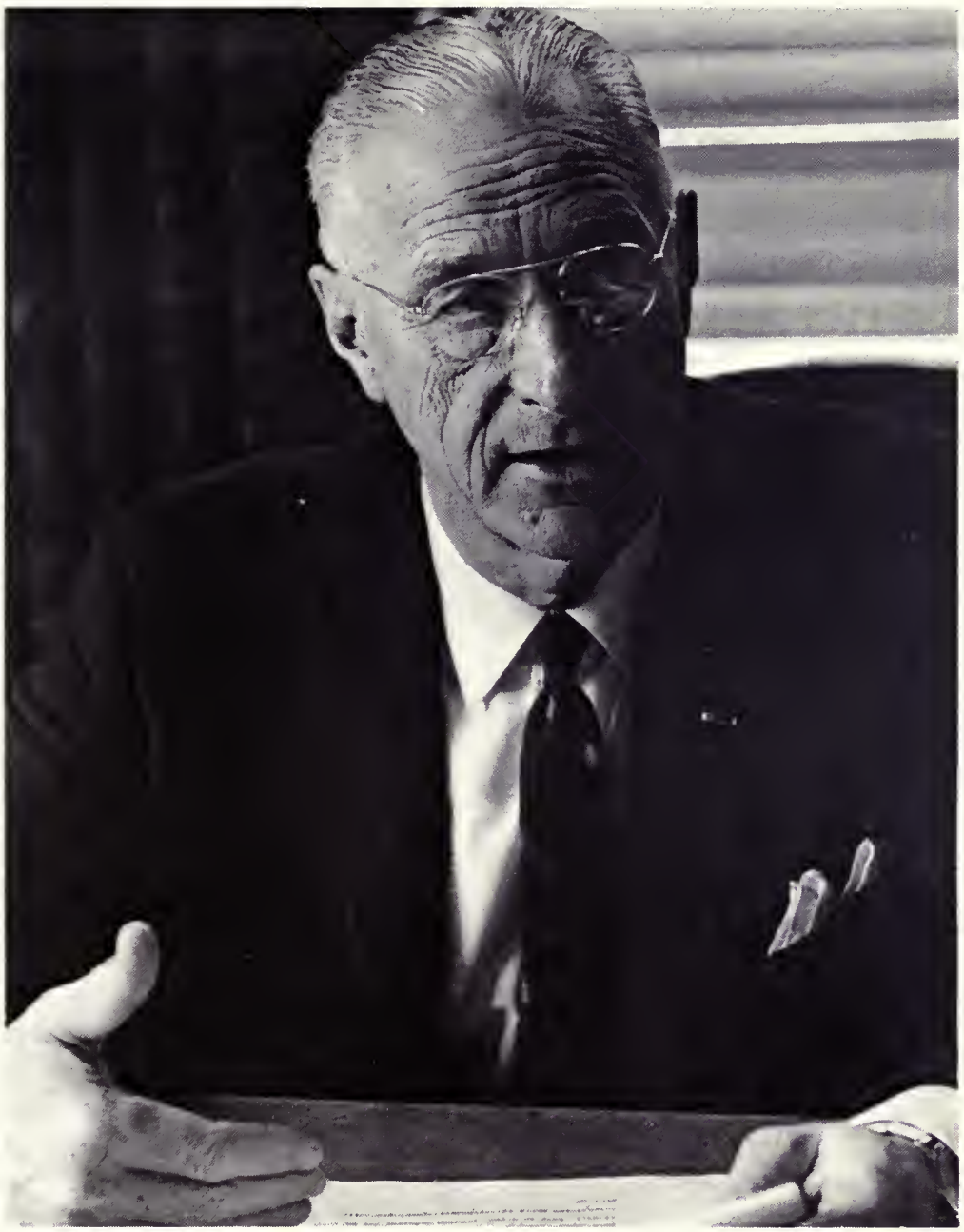

JAMES BOYD

ACKNOWLEDGMENTS

Special thanks are given to those who contributed to the Western Mining in the Twentieth Century Oral History Series in memory of James Boyd.

Clemence DeGraw Jandrey Boyd
Douglas Cane Boyd
Harry Bruce Boyd
Hudson Boyd
James Brown Boyd

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PREFACE

The oral history series on Western Mining in the Twentieth Century documents the lives of leaders in mining, metallurgy, geology, education in the earth and materials sciences, mining law, and the pertinent government bodies. The field includes metal, non-metal, and industrial minerals, but not petroleum.

Mining has changed greatly in this century: in the technology and technical education; in the organization of corporations; in the perception of the national strategic importance of minerals; in the labor movement; and in consideration of health and environmental effects of mining.

The idea of an oral history series to document these developments in twentieth century mining had been on the drawing board of the Regional Oral History Office for more than twenty years. The project finally got underway on January 25, 1986, when Mrs. Willa Baum, Mr. and Mrs. Philip Bradley, Professor and Mrs. Douglas Fuerstenau, Mr. and Mrs. Clifford Heimbucher, Mrs. Donald McLaughlin, and Mr. and Mrs. Langan Swent met at the Swent home to plan the project, and Professor Fuerstenau agreed to serve as Principal Investigator.

An advisory committee was selected which included representatives from the materials science and mineral engineering faculty and a professor of the history of science at the University of California at Berkeley; a professor emeritus of history from the California Institute of Technology; and executives of mining companies.

We note with much regret the death of two members of the original advisory committee, both of whom were very much interested in the project. Rodman Paul, Professor Emeritus of History, California Institute of Technology, sent a hand-written note of encouragement just a few weeks before his death from cancer. Charles Meyer, Professor Emeritus of Geology, University of California at Berkeley, was not only an advisor but was also on the list of people to be interviewed, because of the significance of his recognition of the importance of plate tectonics in the genesis of copper deposits. His death in 1987 ended both roles.

Thanks are due to other members of the advisory committee who have helped in selecting interviewees, suggesting research topics, and raising funds.

Unfortunately, by the time the project was organized several of the original list of interviewees were no longer available and others were in failing health; therefore, arrangements for interviews were begun even without established funding.

The project was presented to the San Francisco section of the American Institute of Mining, Metallurgical, and Petroleum Engineers [AIME] on "Old-timers Night," March 10, 1986, when Philip Read Bradley, Jr. was the speaker. This section and the Southern California section provided initial funding and organizational sponsorship.

The Northern and Southern California sections of the Woman's Auxiliary to the AIME [WAAIME], the California Mining Association, and the Mining and Metallurgical Society of America [MMSA] were early supporters. Several alumni of the University of California College of Engineering donated in response to a letter from Professor James Evans, the chairman of the Department of Materials Science and Mineral Engineering. Other individual and corporate donors are listed in the volumes. The project is ongoing, and funds continue to be sought.

Some members of AIME, WAAIME, and MMSA have been particularly helpful: Ray Beebe, Katherine Bradley, Henry Colen, Ward Downey, David Huggins, John Kiely, Noel Kirshenbaum, and Cole McFarland.

The first five interviewees were all born in 1904 or earlier. Horace Albright, mining lawyer and president of U.S. Borax and Chemical Corporation, was ninety-six years old when interviewed. Although brief, this interview will add another dimension to the many publications about a man known primarily as a conservationist.

James Boyd was director of the industry division of the military government of Germany after World War II, director of the U.S. Bureau of Mines, dean of the Colorado School of Mines, vice president of Kennecott Copper Corporation, president of Copper Range, and executive director of the National Commission on Materials Policy. He had reviewed the transcript of his lengthy oral history just before his death in November, 1987.

Philip Bradley, Jr., mining engineer, was a member of the California Mining Board for thirty-two years, most of them as chairman. He also founded the parent organization of the California Mining Association, as well as the Western Governors Mining Advisory Council.

Frank McQuiston, metallurgist, vice president of Newmont Mining Corporation, died before his oral history was complete; thirteen hours of taped interviews with him were supplemented by three hours with his friend and associate, Robert Shoemaker.

Gordon Oakeshott, geologist, was president of the National Association of Geology Teachers and chief of the California Division of Mines and Geology.

These oral histories establish the framework for the series; subsequent oral histories amplify the basic themes.

Future researchers will turn to these oral histories to learn how decisions were made which led to changes in mining engineering education, corporate structures, and technology, as well as public policy regarding minerals. In addition, the interviews stimulate the deposit, by interviewees and others, of a number of documents, photographs, memoirs, and other materials related to twentieth century mining in the West. This collection is being added to The Bancroft Library's extensive holdings.

The Regional Oral History Office is under the direction of Willa Baum, division head, and under the administrative direction of James D. Hart, director of The Bancroft Library.

Interviews were conducted by Malca Chall and Eleanor Swent.

Willa K. Baum, Division Head
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Eleanor Swent, Project Director
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Western Mining in the Twentieth Century Oral History Series
Interviews Completed or in Process, May 1989

James Boyd, Minerals and Critical Materials Management: Military and Government Administrator and Mining Executive, 1941-1987, 1988.

Philip Read Bradley, Jr., A Mining Engineer in Alaska, Canada, the Western United States, Latin America, and Southeast Asia, 1988.

Helen R. Henshaw, Recollections of Life with Paul Henshaw: Latin America, Homestake Mining Company, 1988.

Lewis L. Huelsdonk, Manager of Gold and Chrome Mines, Spokesman for Gold Mining, 1935-1977, 1988.

Gordon B. Oakeshott, The California Division of Mines and Geology, 1948-1974, 1988.

Horace Albright, Mining Lawyer and Executive, U.S. Potash Company, U.S. Borax, 1933-1962, in process

Frank Woods McQuiston, Jr., Metallurgist for Newmont Mining Corporation and U.S. Atomic Energy Commission, 1934-1982, in process

Samuel S. Arentz, Jr., in process

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Introduction--Simon D. Strauss

Among mining men James Boyd (Jim to all his friends) was a true renaissance man. He was a geologist and what is today called an "explorationist" in that he headed exploration efforts to find new mineral deposits or extensions of old ones. He was an educator at mining schools. He was a corporate executive of mining enterprises. He was a government offical dealing with the problems of the mining industry. As an army officer in World War II he dealt with the problems of procurement of strategic minerals required by the military. And as a presidential advisor he headed one of the landmark studies of resource problems, the National Commission on Materials Policy which reviewed those problems in 1973-1974.

The biographical data are readily available to anyone who would seek them out in such standard reference sources as "Who's Who." But a listing of schools attended, positions occupied, organizations to which he belonged, honors which he received -- such an enumeration while of interest cannot convey a true sense of the vibrant and genial person who was Jim Boyd.

Our paths first crossed when Jim was at the Army Navy Munitions Board as an Army Captain in 1941 and I had joined the staff of the government corporation, Metals Reserve Company, which had the task of procuring metals and minerals for the defense forces. It was early in the year, well before Pearl Harbor, but already the task of identifying mineral requirements in the event of U.S. involvement in the war was being vigorously pursued.

Immediately upon meeting him I had the sense of a man who was unfailingly courteous, cheerful, and pragmatic. His geniality was in sharp contrast with the somewhat testy behavior of many of the government bureaucrats who participated in the prolonged sessions at which government materials policy was debated. For many of them the most pressing priority seemed to be the defense of their agencies' turf position - a common Washington phenomenon. For Jim the only priority was the national good.

Toward the end of the war Jim -- by then a colonel - went overseas to be General Clay's right-hand man in dealing with materials problems as France was liberated and Germany was occupied. We lost touch for a time, but at war's end when Jim returned to civilian life as dean of the faculty at the Colorado School of Mines we would meet at industry conventions. After his return to Washington as director of the Bureau of Mines the meetings became more frequent.

In particular I remember sessions at the outset of the Korean War. Jim was convinced -- rightly as it turned out - that copper and zinc would be crucial problems for military production during the hostilities. By

then I was working for American Smelting & Refining Company, a major producer of both metals, and at his urging the company undertook expansion programs for both.

The earnest and persuasive way in which Jim argued for an increase in domestic mineral production during both the Korean and Vietnam hostilities reflected profound conviction on his part that U.S. mineral resources were still abundant (a belief not shared by all policy makers) as well as a deep-rooted patriotism for his adopted land (after all he had been born in Australia).

Subsequently Jim went into private industry -- first with Kennecott and later as CEO of Copper Range but he was frequently in Washington where his advice was sought by both Republican and Democratic administrations. He played a major role in the affairs of the American Mining Congress and other industry associations. It was at their meetings that I had frequent opportunity to meet with him, in addition to the active role we both played in the Copper Club, an organization of copper-industry people originally established in Washington by persons active in copper-related governmental organizations during World War II. Jim was one of the original organizers of the club, had served as its president, and in 1965 was designated its Copper Man of the Year.

My memories of Jim are related more to his character than to his notable achievements. In the more than forty years during which we were colleagues and friends I cannot recall a single instance in which Jim lost his cool. In the heat of the most controversial discussions he remained genial and courteous.

I recall once, during a visit to London, I ran into Jim and his wife, Ruth, during the intermission at the Savoy Theater. His pleasure at this chance encounter was spontaneous and overwhelming -- one would have thought he had made the trip across the Atlantic just for the opportunity to talk to me. Ruth was already unwell. Jim shepherded her through the crowded aisles like a sheepdog guarding its flock. He made polite excuses to everyone who inadvertently blocked their progress.

It was during her long illness that Jim took up his last major role--that of a lay reader in the Christian Science Church in Carmel, California. This interest continued after her death and his subsequent remarriage to Clemence Jandrey.

The last time we were together was in late 1986. My wife and I were spending a few weeks in Berkeley; we drove down to Carmel for a delightful weekend with the Boyds. Jim was full of enthusiasm for his church work; he was interested in the affairs of the retirement community where they were living. But we had long conversations about the mining industry and our friends in it as well. We plotted the possibility of a golf match on a subsequent visit. Jim was the picture of a vigorous man whose mind was undimmed by his 82 years. It is a picture that will remain vivid in the minds of all his host of friends.

A myriad of adjectives come to mind as I think of Jim--honest, objective, purposeful, energetic, patient, cheerful, tolerant, moral, and above all genial. His oral history, undertaken shortly before his death, will reveal all these characteristics and many more.

Simon D. Strauss
Vice Chairman (retired)
ASARCO
Consultant on metal markets

New Rochelle, New York
June 1988

Introduction--G. Frank Joklik

What I wish to express in these paragraphs is my genuine liking, respect, and admiration for a great man throughout the period of 35 years during which I knew him.

When first I met Jim Boyd, in the fall of 1953, I was already aware of his distinguished record of service in the U.S. Army, the U. S. Bureau of Mines and the Colorado School of Mines. It was with some trepidation, therefore, that I, then a Fulbright Scholar in the Geology School at Columbia University, called on Kennecott's Vice President of Exploration at his office on East 42nd Street in New York. To my relief, my reception was much less formal than I had expected. Jim and a few of his colleagues were clustered around a radio, listening to the New York Yankees beating the Brooklyn Dodgers for the World Series.

Jim's appearance, also, was different from the austere image I had in mind: his handsome countenance was creased in a friendly smile, his blue eyes twinkling, his resonant voice expressing a warm welcome. Perhaps the forthright demeanor stemming from his Aussie background immediately established a bond between us. From that day forward, I cannot remember ever having misunderstood him or having resented anything he said or did. Quite the contrary.

After the completion of my scholarship, I returned to Australia, but the attraction of an organization headed by Jim Boyd and my former boss, John Sullivan, proved too great. Jim, in a period of two years, had built the most high-powered and successful mineral exploration organization ever assembled by a major mining company. High calibre geologists flocked to Kennecott because of Jim's reputation. He was a born leader, to whom setting an example for others came naturally. Working for him was exciting, but those years were not all work and no play. Jim organized periodic get-togethers, at which his social qualities came to the fore: he was a most entertaining raconteur with an excellent sense of humor, very much at ease among men and gallant towards ladies.

Jim was a constant source of encouragement to his subordinates. I remember the summer of 1957 which I spent with a crew in northern Quebec Province battling the muskeg, undergrowth and black flies in the search for copper deposits.

At the end of the season we did not seem to have much to show for our efforts, but I wrote a factual report which came back to me with Jim's handwritten "well done." We went back the next year and found an orebody.

When Jim left Kennecott, in 1960, he gave me the opportunity of joining him, but I couldn't do so because, after many years of bachelorhood, I was intent on pursuing a young lady whom I had met in New York and who later became my wife. Jim understood, and the fringe benefit of this mutual disappointment was that our relationship matured from one that had business implications, to pure friendship that endured over the decades until his death. I remember Jim honoring Pam and myself, shortly after our wedding in England, by coming to lunch in our little apartment in Manhattan.

During the next few years I was working in Australia and we had little opportunity for contact with Jim. But we returned to New York in 1968 and were delighted to join Ruth and Jim at their renowned annual New Year's Eve parties at their home in Greenwich, which had exactly the right mix of formality and fun.

When Jim retired from Copper Range, his ideals of contributing and of serving continued to spur him on from one cause to another. But, at the same time, he never became too busy and hassled to let people enjoy the friendly, entertaining man of the world that could be the life of a large party, or the companion with whom one could spend hour after hour of conversation without wanting for a subject or for words.

His move back to Washington coincided with the change in the fortunes of the mining industry. During the years of his leadership roles at Kennecott and Copper Range, the industry had been favored by strong growth of the economy and consequently increasing consumption of commodities. Mining companies maintained their profit margins and were able to plow earnings into exploration, research and development.

But then came the oil price shock of the early '70's, the clamor for excessive environmental controls and deterioration in the favorable attitude of the government towards private industry. From being in the vanguard in the industrial development of the nation, the industry found itself fighting rear guard actions to preserve its viability. Jim accepted prestigious but onerous and largely honorary assignments in Washington, the common theme of which was safeguarding the raw materials requirements of our industrial society and, in the process, helping to save the domestic mining industry from extinction.

On several occasions when I was invited to address gatherings of industry and government officials in Washington, as well as professional meetings at other locations, Jim was in the audience. I was always relieved to see him, because I knew I could count on him for a friendly question to which I had a good chance of being able to respond with some appearance of knowing what I was talking about. Although Jim never admitted as much to me, I became aware that he had been consulted on my appointment as President of Kennecott and that his reference had done me no harm, to say the least.

In September of 1987 Jim and Clemmie paid a visit to Salt Lake City and spent a week at our home. The trite observation that you have to live with someone to understand them was borne out, once again, by the deepening of our friendship. We came to appreciate, during many hours of conversation, how deeply Ruth's death, years earlier, had affected Jim; and also how completely Jim's love for Clemmie had filled that void. Jim reminisced a lot about the past - particularly his service with General Clay in the War; but it was also wonderful to witness how much, at age 82, he was involved in current affairs and looking forward to the future.

Three months later, when Clemmie called me the day Jim died, I undertook to communicate the sad news to some of Jim's longtime associates and friends in government and industry. To a man, of course, they were shocked. All of them expressed a sense of bereavement. But one of them was silent for a while, and then simply said: "he was a great man."

G. Frank Joklik, President
Kennecott

Salt Lake City, Utah
February 19, 1988

INTRODUCTION by James K. Richardson

It is difficult to write an introduction to Jim Boyd's oral history because he was a warm, cherished friend and my biases are obvious. My friendship and affection for Jim Boyd goes back many years.

His sister Margaret; wonderful "old" Dr. Brown, his father-in-law; his delightful wife, Ruth; his four sons, Jim, Bruce, Douglas, and Hudson and their families were, it always seemed to me, foremost in his thoughts. I thought that he spoiled them as only a devoted father and husband can--but Jim Boyd similarly spoiled his devoted friends, all of whom enjoyed a warmth of welcome coupled with true and almost intimate expressions of caring.

Boyd enjoyed such an impressive professional reputation that the newcomer to his gatherings anticipated an air of austerity, only to be confronted by a completely disarming, friendly, warm, and smiling host. Jim was a wonderful teller of tales and he was an equally good listener. He thoroughly enjoyed telling a tale at the expense of a friend but it was never disparaging or belittling--pure fun! I can see him now with a smile upon his lips and his eyes twinkling as he awaited the reaction of his friend.

This warmth, so evident in his home, he carried with him as he rode the commuter train and on into his office each morning. Each of us with whom he worked felt we were part of his family and he did so treat us. This status we enjoyed so long as we gave him the loyalty that he tried to give us. He gave to each of us generously of his energies and shared his experience in the solution of problems assigned. He was never in my experience penurious or small.

He seemed to have an aversion to "yes men"--in fact, he encouraged disagreement with his views and tentative decisions. He seemed to push on to the wall until all our arguments were exhausted and then he would "take it under consideration." The next morning his opinion might have changed, and he gave the credit to the associate responsible. Of course he always reserved the final decision to himself, and frequently completely disregarded the forebodings of his associates.

In my opinion, Jim gave more credence to the views of his industry peers than was warranted, sometimes to his great disadvantage. In such cases he was unforgiving and never sought to do business with the perpetrator again. Jim Boyd was sensitive to the needs of his staff and took it upon himself to assure that they and their families were happy and economically viable units. He wanted every employee of his company to do well and he chastened those who were penurious and lacking in appreciation of the position of an economic austerity among all employee sectors.

Jim Boyd had many goals and dreams for his group; this dreaming sometimes caused much levity among his peers in the business community. Jim was willing to put his money where his dreams carried him, and he had numerous successes and failures. He firmly believed that his dreams offered solutions to some of the economic problems he foresaw for the minerals industry. He spent much of his energy trying to convince his fellows of the significance of the industry with relation to national welfare. His advice was sought in emergencies wherein federal legislation was concerned, and Jim fearlessly became the industry spokesman. His common sense views were given credence by federal legislators and bureaucrats because of his strong background in economics.

Earlier, I alluded to Jim's strong commitment to family and friends. I never heard Jim express any views with respect to religion, but in his caring for his fellow man and his family he was what one visualizes as a Christian. In his later life he served as a reader for the Christian Science church in his community--it was then that I discovered this religious commitment. Those whom he served were fortunate to have had this man as their reader--he had much to offer them. My personal association with Jim Boyd seemed to have brought me closer to God. Through his deeds toward his fellow men he was demonstrating his Christianity.

Over sixty years ago I used to ride with my grandfather in his buggy to a nearby town and back once a week. These were wonderful experiences for a little boy as my grandfather took from his pocket a book of poems and would read them to me as the horse plodded home in the evening. Upon his death he bequeathed me this book and one poem he enjoyed very much comes to my mind now. It was "He Lived a Life" by H. N. Fifes and its concluding verse was:

> His creed? I care not what his creed;
> Enough that never yielded he to greed,
> But served a brother in his daily need;
> Plucked many a thorn and planted many a flower;
> Glorified the service of each hour;
> Had faith in God, himself, and fellow-men;
> Perhaps he never thought in terms of creed;
> I only know he lived a life, in deed!

This, to me, was Jim Boyd.

James K. Richardson
Senior Vice President (retired), Copper Range Company;
President Emeritus, Arizona Mining Association

August 1988
Silver City, New Mexico

INTERVIEW HISTORY

James Boyd was selected by the advisory committee to be interviewed for the series on Western Mining in the Twentieth Century because of his position in the mining industry and his pre-eminent role in representing mining interests to the government. Mr. Boyd was characterized by Horace Albright, mining lawyer and president of U.S. Borax, as "one of the smartest mining men I ever knew--he's had all the honors that can come to a mining man." Mr. Boyd's wide-ranging career took him to the top in several fields: in engineering education as dean of the Colorado School of Mines; in the U.S. Army Corps of Engineers as colonel and deputy to General Lucius Clay; in government service as director of the U.S. Bureau of Mines; in industry as vice president of Kennecott and president of Copper Range; in public service as executive director of the National Commission on Materials Policy and as chairman of the committee on Surface Mining and Reclamation of the National Academy of Sciences; in professional service as president of the American Institute of Mining, Metallurgical, and Petroleum Engineers [AIME], as president of the Mining and Metallurgical Society of America [MMSA], as a director of the American Mining Congress, and as a member of the National Academy of Engineering.

Anyone connected with mining knows of James Boyd, and many also knew his wife Ruth, through her activities as national chairman of the Woman's Auxiliary to the AIME. She was the first woman to preside over the auxiliary at the same time that her husband was president of the AIME.

In his oral history, the personal account is given of the most publicized episode in James Boyd's life, the long-running struggle with John L. Lewis, head of the United Mine Workers union, over Boyd's nomination as director of the Bureau of Mines. Supported by President Harry Truman, Boyd served on five temporary appointments from August, 1947 to March, 1949; from December, 1947 he received no salary. On March 22, 1949 the Senate confirmed him, voting fifty for, eleven against.

I had known of the Boyds and had met them at mining meetings, but my more personal connection was through my husband, who shared with Jim a deep commitment to mine safety, as they worked together in the 1960s on Mining Congress committees and appeared before legislative bodies to testify on safety in the industry. In 1963, Boyd's speeches and articles catalyzed industry concern for mine safety; he maintained his belief that enlightened managers could achieve safety through voluntary efforts.

Jim Boyd was also an innovator. In his oral history, he speaks of the Dashoveyor, a new type of ore transporting device which he introduced at Copper Range when he was president. My husband once asked someone from Copper Range about its success, and was told cheerfully, "Oh, that's another one of Jim Boyd's ideas."

His title is only briefly a problem; this was a man who could be called Doctor, Professor, Dean, Colonel, Director, or Mister, but he asked to be called "Jim." He combined the friendliness of the Australian, the patriotism of the Englishman, the inventive energy of the American. Not everyone knew of his devotion to Christian Science, but it is apparent from his oral history that this also informed many of his attitudes.

When I approached Jim about participating in our series, he welcomed the idea as he was already at work on his memoirs and considered this an adjunct step. In the event, this oral history must suffice, for his death prevented completion of his autobiography.

Our first planning session was held over a lunch in Las Vegas during the American Mining Congress meeting there in the fall of 1986. Eight interview sessions were conducted between October 17 and November 9, 1986 at Del Mesa Carmel, surely the most delightful setting possible, where Jim lived with his second wife, Clemence. Both of them had been widowed after long and happy marriages.

Our interview sessions always began with a cup of carefully brewed tea served in English china cups. The furnishings in the Boyd home reflected a life of travel and taste. An oil painting of a Western Australia seascape, Italian etchings, and cheerful watercolors warmed the rooms. After tea, we moved into his study, crowded with books, papers, and the new computer which he enjoyed using. On the walls were many photos of prominent men with whom Jim had been associated.

Jim seemed to feel that the peaks in his professional career were the association with General Lucius Clay and his final work directing the National Commission on Materials Policy and the Committee on Surface Mining and Reclamation of the National Academy of Sciences. In these positions, after retirement from the presidency of a large copper producing company and membership on boards of directors of several major companies, he was able to devote himself to a summation of things he believed to be most important: the production of necessary materials for the national good, with the least damage to the environment and to human life. As he neared the end of his career, his concerns widened to include the heightened importance of recycling, and the impact of population growth on resource management.

In September, 1987, Jim attended the American Mining Congress meeting in San Francisco. A few days before that, we met in the conference room of The Bancroft Library at Berkeley for a final brief taping session. He came on the campus shuttle from Davis, where his son is a professor of genetics at the University of California. We had lunch at the Men's Faculty Club with a group that included Professor Neville Cook, nominee for the National Academy of Engineering, and Professor Douglas Fuerstenau, principal investigator for this oral history series. Jim was at his best, alert, witty, and charming.

A few weeks later, he returned the transcript of his interviews with a number of additions and revisions. He had gone over it very carefully. There

were many notations in pen or pencil, and some pages added which he had done on his computer. Several sections were moved for better continuity.

On Saturday, November 21, he and Clemmie went to a dancing party and stayed longer than some of their younger friends. On Monday evening they attended a concert, and Jim listened with special enjoyment to Strauss's "Death and Transfiguration." The next day, November 24, 1987, he died following his customary swim. The oral history might have been much better if he had lived longer for us to go over it again together; regret is tempered by gratitude that we have this much of his remarkable life on record.

Three associates wrote introductions. Simon Strauss, specialist in metals marketing, particularly lead and zinc, and author of Trouble in the Third Kingdom, (Mining Journal Books, London, 1986), has been a friend since he and Jim were both involved in the procurement of strategic minerals during World War II. Frank Joklik, now president of Kennecott, began work for the company as a young exploration geologist when Jim Boyd was head of that division. James Richardson was hired by Jim to be his vice president at Copper Range, in charge of organization and planning.

Thanks are due to Clemence Boyd, who shared the task of selecting photographs.

Some of James Boyd's papers are in the Truman Library, 24 Highway and Delaware, Independence, Missouri, 64050. The tapes of the interviews for this oral history are deposited in The Bancroft Library, University of California at Berkeley.

Eleanor Swent, Project Director
Western Mining in the Twentieth
Century Series

30 August 1988
Regional Oral History Office
486 The Bancroft Library
University of California at Berkeley

BOYD, JAMES

Office: Materials Consultant

Home: 228 Del Mesa Carmel
Carmel, CA 93921
(408-625-0280)

Born: Dec. 20, 1904, Kanowna, West Australia

1927	BSc Engineering and Economics, Cal. Tech
1932	MS Geophysics, Colorado School of Mines
1934	DSc Geology, Colorado School of Mines
1949	Honorary DSc, Montana School of Mines
1964	Honorary DSc, Michigan Tech University

1983-date	First Reader 1st Church of Christ Scientist, Carmel
1979-date	Con. on Geol. & Min. Battelle Nuclear Wastes
1974-1979	Chmn. Materials Advisory Panel Of. Tech. Assessment
1975-1978	Chmn. NRC. Committee on Surface Mine-Reclamation
1973-1978	President, Materials Associates
1971-1973	Exec. Dir. National Commission on Materials Policy
1960-1971	President Copper Range Co.
1951-1960	Exploration Manager and V.P., Kennecott
1949-1951	Defense Minerals Administrator
1947-1951	Director US Bureau of Mines
1946-1947	Dean, Colorado School of Mines
1945-1946	Director, Industry Div. Of. Military Gov. - Germany
1941-1945	Various Assignments in Material Management US, Army Service Forces in Washington, DC, Capt. - Col.
1939-1941	Pres. Gold Crest Mining Co.
1929-1941	Instr. through Assc. Prof. Geol. Colo. Sch. Mines
1927-1929	Field Geophysicist, Radiore Co.

Member: AIME (Pres. 1969); MMSA (Pres. 1960-1962); GSA; SEG; Geochemical Soc., Academy of Political Science; AIPG; Copper Club; Cosmos Club, DC

Awards: Army Legion of Merit with Oakleaf Cluster; 1949 Colo. Schl. Mines Distinguished Achiev. Award; 1962 AIME Rand Gold Medal; 1965 Copper Club, Copper Man of the Year; 1966 Cal. Tech, Distinguished Service Award; 1975 Hoover Gold Medal; 1967 Election to Natl. Academy of Engineering

9/83

Memorial to James Boyd
1904–1987

G. FRANK JOKLIK
Kennecott, 10 East South Temple, P.O. Box 11248, Salt Lake City, Utah 84147

Who's Who in America, 1976–1977, included this statement by James Boyd: "My father imbued me with the concept of duty to any country that adopted me. Whether my immediate occupation was in public service or private enterprise, any action contemplated or decision arrived at first considered this sense of duty." Jim Boyd—scientist, teacher, soldier, executive, public servant, and gentleman—exemplified the principles of duty and service throughout his long life and many careers.

Jim was born in Kanowna, Western Australia, on December 20, 1904. He received his secondary education in England and came to the United States in 1922. He received a B.S. in engineering and economics from the California Institute of Technology in 1927, and an M.Sc. in geophysics (1932) and Sc.D. in geology (1934) from the Colorado School of Mines. Jim became a U.S. citizen in 1925. He was married to Ruth Brown in 1932, a union that was blessed with four sons. Ruth passed away in 1979. In 1981, Jim married Clemence ("Clemmie") Jandrey, who survives him.

Jim's career as an educator began in 1929 when he accepted the position of instructor of geology at the Colorado School of Mines. After several intermediate positions, and receipt of two advanced degrees, he became associate professor of economic geology in 1938. In 1941, Jim took a leave of absence to serve his adopted country in World War II. Following the war, he returned to serve as Dean of Faculty in 1946–1947. During this period he assisted in organizing programs for returning soldiers. Later, as chairman of the Colorado School of Mines Advisory Board, he recommended granting undergraduate degrees in the engineering-related fields of chemistry, mathematics, and physics. A measure of Jim's capabilities and industry is that from 1929 to 1941 he carried on an active consulting practice in mining, oil, and geophysics, concurrent with his studies and educational responsibilities. Jim was awarded the Colorado School of Mines Distinguished Service Award in 1949.

Jim Boyd was particularly proud of the opportunity to serve his country in World War II. Inducted into the Army with the rank of captain in 1941, he served the Under Secretary of War, concentrating on the strategic minerals activities of the Munitions Board. Later he became an executive officer to General Lucius D. Clay, serving on several boards dealing with raw materials and production, and attaining the rank of colonel. After the war he served General Clay in Europe as the director of the Industrial Division of the Office of Military Government in Germany, representing the United States in four-power negotiations regarding industrial operations in Germany. One of Jim's most prized honors was the Legion of Merit with Oak Leaf Cluster, awarded for his contributions to settling immediate post-war problems.

Following a year as Dean of Faculty at the Colorado School of Mines, Jim was called in 1947 by President Harry Truman to become the director of the Bureau of Mines, a position he filled until 1951. At the time of his appointment, he was serving as a special assistant to the Secretary of the Interior, and later was named Defense Minerals Administrator. His appointment as director was followed by a frustrating two-year battle to win confirmation, during which time he served without pay. It seems that John L. Lewis wanted someone more labor oriented to fill the post, but the president and secretary were adamant, eventually winning the necessary congressional support for confirmation.

In 1951, Jim joined Kennecott Copper Corporation in New York as exploration manager, becoming vice-president of exploration in 1955. It was at this time that Kennecott established a separate division of the company to pursue exploration, and Jim was instrumental in many of the technical and organizational innovations that followed. Kennecott set up district exploration offices across North America, established geological and geochemical research teams and geophysical support groups, and assigned operating properties to exploration geologists. Jim urged the exploration group to consider for development any discovery that might yield a large-scale deposit for the company, regardless of the commodity. The patterns of exploration organization and strategy established by Jim Boyd for Kennecott in the 1950s have since been adopted widely throughout the minerals industry. The exploration successes of Kennecott in these years, not only in copper but in titanium, phosphate, lead, nickel, and molybdenum, are a tribute to Jim's ability to set objectives and inspire the teamwork necessary for their accomplishment. Jim continued his public service in these years as well, serving as chairman of the National Science Foundation's Committee on Research, and in other organizations. It was in 1956 that Jim became a Fellow of the Geological Society of America.

In 1960, Jim Boyd accepted the presidency of Copper Range Company, and he succeeded to the position of chairman of the board in 1970. At Copper Range, he presided over the expansion of the White Pine Copper Mine in Michigan, making Copper Range the fifth largest copper producer in the nation. He continued his interest in diversification by acquiring for Copper Range a major interest in the Round Mountain gold deposit in Nevada, which has since become one of the nation's largest gold mines.

True to form, Jim continued to serve a variety of other organizations during the 1960s. He was a director of Felmont Oil, Dashaveyor, and Detroit Edison. He chaired both the Copper Development Association and the International Copper Research Association. He served terms as president of both the Mining and Metallurgical Society and the American Institute of Mining Engineers (AIME). His contributions to his industry were recognized by the award in 1963 of the AIME Rand Gold Medal, the Copper Club's Copper Man of the Year Award in 1965, and by the Jackling Award in 1967. The California Institute of Technology accorded him its Distinguished Service Award in 1966.

Jim Boyd's public service career took on an even greater significance after he retired from Copper Range in 1971. He immediately accepted appointment as the executive director of the National Commission on Materials Policy, generally known as the Boyd Commission, with the charge from Congress of correlating strategic minerals policy within the administration. From 1973 to 1979, Jim was president of Materials Associates, but appeared to spend the majority of his time in public service. He was an active member of the Material Advisory Board, the Board on Mineral Resources, and the Supply Panel of the Committee on Atomic and Alternative Energy Systems; in addition, he chaired the Committee on Surface Mining and Reclamation, the Committee on Legislative Opportunity in Basic Material Industries, and the Materials Committee, Office of Technology Assessment. His leadership in these posts was instrumental in the development and passage of the National Materials and Minerals Policy Research and Development Act of 1980. Again, Jim was honored in numerous ways, including being awarded the American Institute of Professional Geologists Parker Medal in 1973 and the prestigious Hoover Medal in 1975.

In the 1980s, Jim approached retirement. He continued to serve as an advisor to both government and industry. He was always pleased to record that from 1983 to 1985 he was First Reader, Carmel Christian Scientist Church. In 1988, The American Institute of Mining, Metallurgical and Petroleum Engineers granted Jim its 1987 Minerals Economics Award.

It is both humbling and inspiring to recall that, during his long and prolific career, Jim Boyd always found time to provide personal help to any of his friends and acquaintances in need. He is remembered by us as an exemplary figure in public and private life.

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I FAMILY AND EARLY SCHOOLING

[Date of Interview: October 17, 1986] ##

Swent: This is Friday, October 17th, 1986, and we're in Carmel, California, at Del Mesa Carmel. I'm Eleanor Swent and talking with James Boyd in his study. First, you might just briefly tell about some of your distinguished forebears and how you started in the mining world.

Grandfather, Lewis Henry Boyd, Advisor to Herbert Hoover

Boyd: My father was the son of a Sydney [Australia] stockbroker who moved to the London stock exchange about 1896.

Swent: From Sydney, Australia?

Boyd: From Sydney, Australia. While he was in the stock exchange, both in Sydney and London, he used to help Mr. Herbert Hoover, who later became president of the United States, to finance his mining ventures all over the world, in Australia, in China, and in Borneo and places like that.

Swent: Had they met in Australia first?

Boyd: I don't know. I don't know whether they had met before.

Swent: I was wondering if Herbert Hoover went to Australia because of any connection with your grandfather?

This symbol indicates that a tape or segment of a tape has begun or ended. For a guide to the tapes, see page 229.

Boyd: Probably. But more likely he would have gone to Australia because he had gone to England and become a member of a consulting firm there. In those days, consultants like Mr. Hoover or John Hays Hammond and people like that were expected to put their own money into the ventures they recommended. Today it would be considered to be unethical. Probably because the system got abused by unethical men. It was a pretty good idea. It made them careful what they did.

Swent: You thought it was a pretty good idea that you cannot do it now?

Boyd: No, that you could do it then. I mean, if you were going to go out and recommend an operation, you'd be more likely to have people put the money up if they saw your money in there.

Swent: In other words, if you thought it was a risky venture, and your own money was in it, you would be less apt to recommend it?

Boyd: That's right.

Swent: Why has the opinion on that changed?

Boyd: Well, it's because people are afraid that people cannot be particularly honest and do something besides. The result is that the law kind of makes it difficult for an insider to have an advantage to what he does. When I went to Copper Range Company, I was given stock options to make me want to change my job, to go with them. That still made you a part of a deal so you earned your way.

I've heard of great people that went through and didn't get paid any salary at all. I think the great one of those is the present president of the Chrysler Corporation, Iacocca. He wasn't paid a salary. He had to demonstrate and earn his way as president of the company. So I can never understand why it is the wrong thing to do. That was how many of these people, like Hoover, Mr. Hoover, and John Hays Hammond, and others, made their fortunes by the ventures that they established [and] operated for the people who put the money up for it.

Father, Julian Boyd, Mining Engineer in Australia

Boyd: Anyway, that moved my father's family back to England, and they settled in Surrey. Dad then went to the Royal School of Mines in the Imperial College in London. He had no degree from it, but he was just merely a fellow of the Royal School of Mines. Mr. Hoover then sent him to Western Australia, because this was the beginning of the gold rush in Western Australia, which was the second gold rush. The first gold rush was in Victoria, and the prospectors were

Boyd: digging holes all over the place. Each one was given an allotment of land and he had to dig for the gold on that little plot of land. That's why the Australian soldier was called a digger.

Swent: That was in eastern Australia?

Boyd: Southeastern Australia. It was in Victoria.

Swent: And that was shortly after the California gold rush.

Boyd: Yes, that was just a little bit after the California gold rush.

Swent: And then the Western Australia gold rush--

Boyd: Was later. It was about in the 1890s. Dad must have gone there about 1898.

I've been thinking about the fact of the timing, because Mr. Hoover sent him out to Australia. He had in the meantime met my mother. He had a friend out in Western Australia when he went out there. This friend had a lady friend that he was thinking about getting married to. He sent for her, and my mother went along as a sort of a chaperone.

Swent: From England?

Boyd: No, from Melbourne, Australia, because Mother came from a Melbourne family. She was sort of a chaperone when she went out there. This other man got sick, and he sent my father along to meet these two girls that came up on the train from Perth. Remember, there was no train running across Australia then.

Swent: I was going to say, how did you go from Melbourne to Perth?

Boyd: You had to go by ship, and a sailing ship at that, around the south, across the Bight, and into Fremantle. Then they took a train from there up to Kalgoorlie. In my day there was no train from Kalgoorlie eastward to Adelaide.

Swent: No, that's fairly new, that Nullarbor train.

Boyd: Well, it was soon after that, though. It was a weird thing because each state it crossed used different gauges.

Swent: You could go straight through across Australia now.

Boyd: Yes, that's right. Clemmie [Clemence DeGraw Jandrey Boyd, the second Mrs. James Boyd] has been on that train.

My father was in the Kalgoorlie area. There's a little town called Kanowna, which is twelve miles east of Kalgoorlie, where Dad

Boyd: was doing some development work on mines. They went there about six months after they were called back from southern Rhodesia. Hoover had sent them to southern Rhodesia to work on some mines over there and then transferred him back to Australia. Six months after they got back to Australia I was born. I always considered that I was conceived in Zimbabwe and born in Australia.

[tape shut off]##

Swent: Did your mother just stay on or go back to Melbourne?

Boyd: No, no. She stayed right there, and the doctor that came to deliver me was so dirty that she wouldn't let him touch her. She had had some hospital experience. Her mother had died in childbirth with her sister. Then her father remarried a governess. The family didn't like her very much, so my mother ran away from home and went to become a nurse. That's where she had had training. So she knew how to deliver babies and she did it by herself rather than have somebody else do it that she didn't trust.

Then my brother was born, Lewis Henry Boyd, named after his paternal grandfather. We always called him Bill. He's known throughout the industry as Bill. He was born in a town called Menzies. Now, Menzies is a famous name in Australia. Since then there's been a prime minister named Menzies. But the Menzies were well known, and this little town was about sixty or seventy miles north of Kalgoorlie.

My father apparently was overseeing prospects, sinking shafts and seeing whether they were prospective mines or not. That's one of the ways you operate in the mining business. You get a prospect and you dig a little bit on it to see whether there's any geological reason. Then if you get encouragement, you sink shafts or whatever you need to do. That had to be done before you could prove there was an ore body there that was worth developing.

About this time, by 1907, he was moved to Boulder, which was a town adjacent to Kalgoorlie. He was made the manager of the Chaffers Mine, which was an established gold mine.

Swent: Was your grandfather still in London?

Boyd: Yes. I don't know much about that family's history. Of course, we got to know them when we moved to England later.

Swent: I was just thinking it must not have been easy to communicate back and forth between Kalgoorlie and London.

Boyd: No. I don't ever remember any communication at all.

Swent: You wouldn't get much direction from your head office, would you?

Boyd: Well, they had to do it by mail. That went by steamship, and there were not many steamships.

Swent: But the man on the property had to make a lot of decisions.

Boyd: Absolutely. I saw a letter once that Mr. Hoover wrote in reference to that in which he obviously had a lot of confidence in him. He would take his advice. He was operating this gold mine as early as I can remember.

When we were in Kanowna I was three years old. I fell down a mine shaft seventy-five feet deep. They apparently had been feeding tailings, ground rock, into this thing, and I had gone out walking with my little dog. We were pushing tailings into the hole, and apparently we undercut the thing. The dog tried to go with me and we went down it. He was down in the shaft with me.

They hunted for me all day, then finally they heard the dog barking down there and Dad came down. My earliest recollection is Dad carrying me up the ladder with a candle in his hat. I don't remember falling down; I don't remember anything before that. But I distinctly remember being carried up that ladder with that candle in his hat.

Later on, as I got a little older, and Father was going to the mines on Saturday, he would take me along with him. I went underground with him in the gold mine, Chaffers Mine. I can remember those occasions very well.

Swent: From childhood, really.

Boyd: From childhood, yes. We wore candles in our hats in those days. They allowed something they won't allow today, and that's blasting in the mine while people are still in the mine or anywhere near the blast. One occasion I remember, we were on one level. They were blasting the level below, and it blew our candles out. We were suddenly all in the dark and we had to relight them. I don't remember being frightened by that either.

My first--what would you call it--an exposure to death, was to see a donkey, a dead donkey by the tailings pond of the mill. I remember asking Dad about that, and he said, "Well, he had probably been drinking the cyanide solutions."

Remember, gold is soluble in cyanide. It was used in those days to recover gold, and apparently the donkey drank the effluent. So I always remember that cyanide provided my first occasion to visit death. I think there's a better word than that, but that's all right for now.

Maternal Relatives

Swent: I do want you to mention your mother's family.

Boyd: My mother's maiden name was Cane. Her grandfather sent her father and his brother out to Victoria with eight thousand pounds. And remember, eight thousand pounds back in the 1880s was a lot of money. They bought something like a million acres of land, the kind of land where it took ten acres to run one cow, I think. But it was around Ballarat. That was where the famous first gold strike was in Australia.

Their home was near Ballarat. What happened to that land I don't know, but when my grandmother died and the governess who became his second wife took him off to see the bright lights in England, they had to go by sailing ship, and they were gone some months. While they were gone one of those great droughts came along and pretty well wiped them out. I don't have much knowledge about that, although I have four cousins still living in Melbourne, and we visited last summer, our winter. They've given me a lot of that information and I really haven't studied it very far.

Mother was born in England because the family was visiting England when she was born. She was born in a town called Felixstowe, the home of the Allenbys. They must have been staying there because the Allenbys were there. Mrs. Allenby was an aunt. That was Field Marshal Lord Edmund Allenby's mother, whom I met when we were in England. We went down to visit her. She was a very wonderful old lady.

Swent: What was his claim to fame?

Boyd: His first claim to fame was leading the retreat from Mons in the First World War. A retreat is the most difficult military operation, and he successfully retreated from the Germans in Mons into France. He is best known for his conquest of and the liberation of Palestine from the Turks. (I have pictures of him walking into Jerusalem rather than riding his horse as a conquerer.)

Swent: And the Allenby Bridge is there.

Boyd: Yes. Allenby Bridge was built in memory of him because he was pretty thoroughly appreciated by the people. I've got Lord Waverly's, Viscount Waverly's book here on Allenby in Egypt. He describes the character that Allenby was. He was a pretty tough soldier, I guess. I remember when he came out later in between the wars to California he called on my mother. My father called her Molly, but he called my mother Mary. He said, "Mary, they want me to plant a tree in the forest of fame in Hollywood." He was tickled about that.

Boyd: I never got to meet him. I met his mother but I've never met him. He was a great friend of Sir Robert Baden-Powell, the founder of the [Boy] Scout movement. It was Allenby's son that named it that, because the two great friends were out riding horseback, and they came back and this son was up in a tree. He said, "Pow, pow, pow. You didn't send your scouts out, so you're dead." He was killed in the First World War.

That sparked Baden-Powell to call it the "Boy Scout" movement. Somewhere Mother kept a cutting of that in the newspaper. I haven't found it again. I haven't thrown that kind of stuff out, so someday I might find it again.

Swent: Has your family been active in Boy Scouting, then?

Boyd: Some of them were. I had only one brother; he was not. My oldest son was an active Boy Scout. My third son was a Sea Scout, but my second and fourth sons had no such use for such activities. The Sea Scout's son is an Eagle Scout and is going to a Jamboree in Australia in 1987-88.

Swent: You weren't a Boy Scout?

Boyd: Yes, I was a Boy Scout, sure. But don't forget, when I was a Boy Scout it was an embryonic movement. This is when Baden-Powell was still getting it started. We weren't as well organized as they are today. We would go out on camp trips. I remember once I camped on the Swan River in Perth and I got a good sunburn. I walked home and I had sixpence in my pocket. The cab driver drove me as far as he could take me for sixpence, and I had to walk with my pack on my back, back to the house on Cottesloe Beach.

Swent: You were living then in Perth?

Boyd: Well, we always spent the summers there. Dad built a house on the beach in Cottesloe Beach, which is a suburb of Perth. He sent us down there. In those days it was just beautiful, rounded white sand dunes on the Indian Ocean and no houses except the few, the one we lived in and two others. There was a little hotel down there, Cottesloe Beach Hotel, but now there's a golf course where our house was, I think. It was my memory as I went back on this recent (1986) trip. We drove along the front and I'm pretty sure that the golf course now is where our house was. Of course, this is where the yacht race will be held, in sight of Cottesloe beach in February, 1987.

Swent: America's Cup.

Boyd: Yes.

Schooling

In Australia

Swent: Did you go to school in Australia, or did your mother teach you?

Boyd: Well, since we would go down to Cottesloe Beach in the middle of summer to get us out of the heat of the desert, we would be put in school in Perth. I went to Canon McClement's School. It was in a kind of an old baronial-looking building, and I'm pretty sure I saw it when I was in Perth last February, 1986.

Swent: Were you Anglicans at that point?

Boyd: Oh yes. The men of my mother's family were either sailors (an uncle was first hand of the Admiralty, Churchill's boss in 1914), soldiers like Allenby (I think that there were about seven fatal casualties in World War I), or Anglican ministers. The picture referred to is the one hanging in my study of Grandfather with his five sons. From left to right, back row: Jack, who lived the longest, was bombed out of his lodgings twice in World War II; Sol, who was a surgeon on Harley Street; Arthur. Front row left: Julian; Grandfather Frank who was on the Stock Exchange and had the only other children, Budge and Audrey.

We became Christian Scientists because my father's youngest brother who is in that picture got very ill and he was healed in Christian Science. That impressed Mother and Dad so much that they took up the study. I don't remember when I wasn't a Christian Scientist. There weren't many Sunday schools around to go to so they had to give us Sunday school themselves. But there was a Sunday school in Kalgoorlie and there was a Sunday school in Perth, and plenty in London.

Swent: Christian Science?

Boyd: Christian Science. The church that we went to in Perth last February has been built since then, so it wasn't the same church, but it was the same organization.

While Dad was in Rhodesia, it was the end of the Zulu wars. They required that all of the Europeans be taken into the armed forces, so he was a trooper with a commission in the British Army.

Swent: This is before you were born?

Boyd: Yes, that's before I was born. But in 1914 when Australia joined the rest of the Commonwealth with England when England had declared war, he was called up immediately. That would be 1914. We went

Boyd: to the camp to see him before he left, and we watched him get on board the ship.

There's a book now out, and I don't have a copy of it here. It's called A Satisfactory Life. It's the story of a poor man, a youngster, who was really enslaved in the agricultural zone between the deserts where we were and the coastline. They had farms and wheat fields and cattle and things like that. He had never gone to school at the age of fourteen, and his education came from getting some help in reading and just reading from there on. In his eighties he wrote this book. It isn't a great masterpiece of literature, but it's a fantastic description of what his life had been. He joined the Australian forces back in 1914 and was wounded in Gallipoli. Dad, of course, was taken in [at the same time].

Swent: Was your father at Gallipoli?

Boyd: He was wounded at Gallipoli, too. Not only that, but they were in the same battalion, 11th Battalion. I don't know whether they knew each other or not. Dad was a commissioned officer and I think the man who wrote this book got to be a sergeant in along the line.

Swent: I've only been to Australia once, and only stayed for a month, but no American can realize until you really go there, I guess, how strongly that Gallipoli memory lives in Australia.

Boyd: A lot of Australians died there. It was murder.

Swent: It was just an appalling thing.

Boyd: Somewhere in my papers or our papers was a description. I don't know whether Mother saved it or not. I haven't found it since she passed on. A fellow wrote an article in the newspaper describing what my father had done in that campaign. They had captured a Turkish trench, and the Turks were counterattacking. Dad had only five or six men in his company left. They had boxes of grenades and they would run back and forth and throw these grenades out from various places to make the Turks think there were a lot of people there still. One time when he came back to a box, a Turkish grenade came into the trench. Dad pulled a sandbag down on top of it, and blanket on top of that, and sat on it. It went off. He remembers pulling up his trousers while the fighting was still going on. When it quit he looked down and he had got a piece of bomb through his knee and he was wounded. They relieved him and took him to Egypt.

About that time they decided to move us--my mother, my twin sisters, and my brother--to England. We took ship from Fremantle, and went through the Suez Canal. We had on board the Viceroy of India, so they gave us a destroyer escort when we got into the Mediterranean.

Boyd: One day I remember clearly the destroyer was over on the port side, and suddenly a noise came. There were all kinds of sirens and whistles, and she took off. You could see that plume off the bow of that ship. Then we heard gunfire. A German submarine was trying to sink us. This destroyer went up and sank it. We heard about this later. This so scared so many people that when we got to Marseilles a lot of people left the ship and took trains across France. The Germans hadn't intercepted that yet. Then, of course, the channel to England. But we stayed with the ship.

Swent: Wasn't the war in France by that time?

Boyd: Oh yes, in the northern part of France. You could get across still and across the English Channel. But we stayed aboard. A week or ten days after we got off, she was blown up either by a torpedo or a mine--I never knew which--and was sunk off the coast of England.

Swent: Now you were what, about twelve, eleven?

Boyd: This would be 1917, so I was thirteen, wasn't I? No, I would be twelve.

Swent: It's interesting that they would move civilians through war zones, really.

Boyd: I can't answer that question for you. I don't know where they went, but there was no war in southern France, Marseilles. The Germans were still up around Verdun and places like that north of Paris. So they could come in and go up and across the channel at Cherbourg without getting into the war zone.

Later on Dad went to France and did some fighting there, but he was called back. I think his leg was giving him trouble still, and he was called back to England and became the President of Court Martial for all the Australian troops in England. When the boys were a little wild they would get court martialed, and he had to run the court.

Swent: Was this your first time in England?

Boyd: No. My parents went to England when I was about one or one and a half. I was christened in Harlech, Wales. Later on, when John L. Lewis, the one who picked on me, you know--I'll tell you about that later. I knew more about Wales than he did, and he considered himself a Welshman.

Swent: You were a real "man of Harlech"?

Boyd: That's right.

Swent: Why did you go to Harlech?

Boyd: Well, because my mother's eldest sister and her daughter and her husband met us in Wales, and my cousin and I were--I don't know whether she was christened there or not. Anyway, my aunt was living in Kenya. They were some of the first white settlers in Kenya. They went there before 1914. Have you seen the picture called the--

Swent: "Flame Trees of Thika?"

Boyd: "Flame Trees of Thika," yes. I'll tell you a little more about this in a minute. But this was interesting to you?

Swent: Yes, it is.

Boyd: They lived south of Thika, Kenya, but not very far. They settled there and grew tea and coffee. But my uncle got called into the war, and my aunt then had built little cabins around to house people who were escaping from the danger zone, and they really liked it so much that they started coming back, and she had to start charging. So she made it what she called a hotel. Anyway, she brought her daughter to England and I was christened there, and I think Margo, that's her daughter's name, is still living, and we went to visit her when we went on the 1986 trip. She said she's vastly older than I am. I think it's six months or something like that.

Swent: Where's she living now?

Boyd: She lives in a house that her mother built outside the "hotel" grounds for her family. The installation consisted of a central eating and meeting hall surrounded by cottages. Her daughter had to sell it some time ago. She and her husband lived in it after Aunt Violet Cane died.

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Boyd: She was an only child, and she had only the one daughter that still lives there. She's married to a man who is managing director of a tea and coffee company and they have three daughters. So they produced no male children at all.

In England, 1917-1921

Swent: How long were you in England then?

Boyd: We went to England in 1917. I was put to school, prep school, in Surrey, in the same town, Kenley, where my grandmother, my father's mother, lived. They lived on a beautiful estate. A Roman road ran through called the Hathe. It was there that Mr. Hoover came to visit my grandfather when he wanted to raise money or for arrangements that he had to make, to do his work all over the world.

Swent: And you also had uncles who stayed in England?

Boyd: Yes. Oh yes, they were all there. All five of those--Dad was of course in the army--but those four brothers were alive then. [indicates a photo on the wall]

Swent: And they all stayed in England. He's the only one who went off to the colonies?

Boyd: Yes, I guess so. Yes, because Uncle Frank and Uncle Jack were with their father's concern. The eldest brother was a doctor on Harley Street. I don't know what Arthur did. He wasn't very well. You can see in the picture he wasn't very strong.

Swent: Did you feel that you were sort of an outlander, or colonial?

Boyd: No, I don't remember feeling that. Actually, I stayed in Uncle Frank's house, and he was the only one, besides Dad, who had any children. He had a daughter and a son. That son, Budge, became a foreign service officer of the British Foreign Service, and he married an actress, a very lovely lady. But they never had any children. The daughter Audrey had a boy and a girl, and they moved back out to Australia later on. I never knew them at all. Budge was sent to California and was a consul in Los Angeles, so my twin sisters got very close to them. I was in Colorado in those days and never saw him.

Swent: Do you remember, when you went back to England did they tease you about they way you spoke, or did you have any difficulty being an Australian?

Boyd: No. I don't think so. I still have a lot of Australian in me. Of course, besides those four brothers, Dad has three sisters, and they were home. One of them was married to a naval officer, and she lived there with her mother. So I used to go visit them on Sundays, the three, Chill, and Bess, and Violet. Violet was the wife of the oldest brother. They very carefully knocked my Australian out of me [starts speaking with an Australian accent]: "My English aunts knocked the Australian out of me." [resumes his normal accent] Most of it. I still have some of it. If I'm aware of it, I don't know it. You automatically correct those things which you hear.

Swent: You don't have too much left.

Boyd: But people recognize it.

Swent: I noticed you said your mother had a cutting; I would say a clipping.

Boyd: Yes, that's right.

Swent: That's English.

Boyd: Yes. I've got to use some Australian expressions.

Swent: That's all right. That's nice.

Boyd: Anyway, we went there, and I was put in prep school--it's called prep school there, which is grade school, private grade school--in the town where my grandmother lived, so I could go home to her house on Sundays and play croquet or chess with her.

Swent: But you were boarding during the week?

Boyd: Oh yes, I was boarding in the school. I was there throughout the rest of the war. When armistice was declared I was sent to put up the British flag. I put it on upside down. That's how I remember that. [laughs] From there I was then admitted to one of the English public schools called Oundle. That's in Northamptonshire, in the town of Oundle just south of Peterborough.

Swent: That's quite a ways away from Surrey.

Boyd: Yes. Mother had a flat in London, and during the time that Dad was President of Court Martial he could come home on the weekends and be with her. I was at Oundle, and my twin sisters were at a girls' school called Bedales. I don't know where brother Bill was. He went to school somewhere else.

On holidays we would stay in the flat and go and visit the museums all over London, and so forth. But we went to Sunday school in the First Church of Christ Scientist where Lady Asquith later on would be. She used to be a member. So I spent then, I guess, a year and a half at prep school in Surrey, and then I spent three years in the public school at Oundle, although I didn't graduate there. In the meantime Dad was being demobilized from the army and was hired to run the borax mines in Death Valley.

Swent: It was from London then, that he came to America?

Boyd: Yes. Borax Consolidated was a British firm. One thing, they wouldn't trust the American mining engineers in those days, and they had to have a Britisher. That's how he got sent over there to run that.

Swent: Did James Gerstley come over then, or later?

Boyd: Later on. But that was when Dad was retired. They retired him, and kept him on as a consultant. They paid him his salary as long as he lived. But that's another story. He had quite a story of being up there.

In Hollywood, California, 1921-1923

Boyd: Mother came over to see whether or not we should migrate. Then they decided that we would move to Hollywood and Dad could come down over the weekends or once or twice a month to see us.

Swent: This would be your senior year in high school?

Boyd: No, the end of the junior year. I would have had another year in the English public school.

Swent: That's sort of a hard time to move, isn't it?

Boyd: I suppose so, but I don't remember it being much. It was quite an exciting thing, so it never bothered me. I remember we came over on a very stormy sea. Everybody was sick but us.

But there were a whole lot of reporters aboard. When we got to New York, immigration authorities came aboard and said that we were Australians, and the Australian quota was filled, and we couldn't land. But Mother was born in England, and the English quota wasn't filled, so she could land. Well, the reporters took this up. Here were these wonderful children. They got people down in the hold, all the riffraff of Europe they were letting in, and they couldn't get this wonderful family in. So they made a fuss about it.

We walked down the street with our little English caps on, the four of us, and they took pictures of us and they had it on the front page of the newspapers. Dad didn't hear anything about this. Someone handed him a newspaper in Los Angeles saying his family had been held up. Anyway, the company, the borax company's lawyers got after this back and forth from Washington, and they finally got us admitted as students. We were then put on the subsequent year's quota. That's how we got admitted.

Swent: How did your father get in? Did he have any trouble?

Boyd: No. Apparently his company worked him in somehow. Probably that quota wasn't filled when he went in.

Swent: He didn't anticipate this problem at all.

Boyd: No he didn't. They were about to send us home. Then the reporters really raised Cain.

Swent: So you went to Hollywood High then?

Boyd: Dad in the meantime rented a house in Hollywood and I went to Hollywood High School and finished in a year and a half. We arrived in December of 1921, and I graduated in 1923.

Swent: That was the heyday of Hollywood, I guess.

Boyd: Oh sure. A fellow by the name of Joel McCrea was a classmate of mine, and he became a great star. Here was a green English schoolboy who when he went to school, his schedule [pronounced "shedule"] was made out for him, and he did what he was told. I got down there and I made my own "skedule" out. Joel helped me make my schedule out and went to class with me, the English class, I remember. I've never seen him since. He's still living, and he did very well. He was acting until recently.

Swent: He was a fine actor.

Boyd: Yes.

Swent: This must have been pretty exciting for you.

Boyd: Yes, I think so. Dad bought me a bicycle. I had to ride a bicycle through downtown Hollywood. You wouldn't dare let a child ride through Hollywood today on a bicycle.

Swent: That was really the beginning of the golden age of film, wasn't it?

Boyd: That's right, sure. After we had been there less than a year Dad bought a house up on the hill. You know where the "HOLLYWOODLAND" sign used to be, now it reads just "HOLLYWOOD." For a brief time in 1987 the people got up in the morning to read "CALTECH." Well, on one of those ridges down below that they bought a house. I used to ride a bicycle down there to Hollywood High School. Bill went there too.

My sisters went to grade school down on Franklin right below. Then they went along to Hollywood High School and up to UCLA. But they were six years behind me.

Swent: The twin girls?

Boyd: Twins. Yes.

Career Decision

Swent: Were you thinking by now of becoming a scientist, or going into mining like your father?

Boyd: Yes. Dad tried to keep me from being a miner. He said, "There's no way you're going to be a mining engineer." But I wanted to be an engineer. I'd been enough around it that I wanted to be an

Boyd: engineer. I found that I was good enough at mathematics. So I decided that the only place to go would be to Cal Tech [California Institute of Technology].

Swent: You had really not had much contact with mining except--

Boyd: Except through Dad, none.

Swent: No. You were going to school in Perth.

Boyd: Well, no. We went back. During the winter months we were in Kalgoorlie, or Boulder, so I would frequently go with my father down to the office. One day I went down to the office and we had a horse-drawn two-wheeled sulky, it was called. The horse tripped just as we were coming into town and threw Dad out. The reins went with him and I couldn't reach the reins. He bolted through Boulder, missing the street car poles by inches. At the far end of town an abo [aborigine] on horseback tried to save me, but he got in the way of the horse turning a corner to take us to the stable, which he would have done, and turned the cart over, and I landed on my elbow on the steel rim and broke it. Oh, I was a hero.

Swent: Did you ever work in the mines in the summer?

Boyd: Oh no. See, we left there in 1917, and I was only thirteen years old.

Swent: So you didn't have any first-hand experience at mining at that point?

Boyd: No. I didn't have any mining experience until the summers at Cal Tech, or the last summer at Hollywood High School. Then I would go up and stay with Dad at the mines, and he would get me a job as a mucker, or a miner, or a mechanic or blacksmith, or a machinist. They taught me how to be a plumber and every kind of thing. I had to learn how to drive a truck. Have you ever been to Death Valley?

Swent: Yes. Not for a number of years.

Boyd: Well, you've been there since the hotel was built down there?

Swent: Yes.

Boyd: Well, it wasn't there then. There was a ranch there then, and there were Indians there. We built an Indian schoolhouse, and one summer I drove a truck down there taking the materials for that Indian schoolhouse. As you probably remember, there are date palms there. My mother planted those date palms, and they had to be grafted in order for them to bear dates. She raised these palms from seeds and planted them down there.

Mother's Experience in Rhodesia

Swent: Your mother must have been a very flexible woman.

Boyd: She was a wonderful woman. Let's go back a little bit if that's interesting to you. When we were in Rhodesia she was the only white woman within five hundred miles. She carried a whip in her hand and a pistol on her hip. I don't know how true this story is, but if she didn't wave that whip at these boys, they would think she didn't love them very much. They expected to be treated harshly. I'm sure she was too mild to do that.

Finally one of the other engineers up there sent for his wife and Mother went down to meet her towards Bulawayo. At the top of the pass they were supposed to meet the husband of this other woman. He got there drunk. They put him in the back end of the wagon and sat up on the driving board. They were surrounded by baboons all night long until he got sobered down so he could drive them back down to the mine.

Then she tells the story how she was in the house provided for her and one day she saw a black snake coming, a great big one. Those snakes are pretty poisonous in Africa. She jumped on the table and started screaming. Dad got there and here was the snake climbing up the leg. He had to shoot it.

Then on their way up to Bulawayo, where the mine was--they went there on their honeymoon, you see. They were married in Australia and they went out to this assignment in Africa. She had all her trousseau in one of those round top trunks, and it was tied on the back of the wagon. When they got to a place to stay overnight, they found the trunk had gone. He went back two days' journey and never found it. So all the silver and everything else that she was getting as a bride were gone and she had to start from scratch. The only thing she had was Mrs. Beaton's cookbook. Have you ever seen Mrs. Beaton's cookbook?

Swent: No, I haven't.

Boyd: It's this big, six inches thick, and all designed on how you could feed thirty-eight people for dinner. It had these beautiful colored pictures. Somewhere I've got it. I haven't thrown it away. And she had never cooked in her life.

But she did when she got to Bulawayo, she had to cook. I think she became a good cook. She had to feed us the rest of her life. Her arm was strong enough to beat up a plum pudding. That's pretty stiff.

Swent: So I guess Hollywood didn't hold many terrors for her after all she had been through?

Boyd: No. The worst terror she had was going down to buy meat. She would say to the butcher, "Now I want this joint or that joint." They would all laugh at her and didn't pay attention.

Finally one took her and he said, "Now madam, we don't use those words here. This is what we call this, what we call that." She never went to anybody else ever again. She always went to that butcher. Some day he had five or six butcher shops that he had earned by being a good salesman.

Swent: So you did go out then and see what the mining was all about.

Boyd: Yes.

Swent: Was the borax mine an open pit operation?

Boyd: No. Heavens no. It was underground mines up in Ryan. Originally, of course, borax was mined out of the lakes in Death Valley. The twenty mules went out there and brought it back. That was the story, but it never worked very well because they could never take enough water to supply the mules, and half the mules were horses. Because of all the hay they had to have, there wasn't much room left for borax.

Swent: There was a little hype even then, wasn't there?

Boyd: Yes. [laughs] So by the time Dad got there they had built the railroad from Death Valley Junction up to Ryan, where the veins of borax were. That's where he was when he took over. I would go and stay with him in the summertime and I was taught to be a mechanic. I was even taught how to weld and take care of the electrical equipment and things like that. Furthermore, at both the school in England and at Cal Tech, I had to take shop. I spent a whole term in England in the shops learning how to shoe horses, how to weld things, how to do carpentry, how to make patterns for making castings, and things like that. The whole term was really spent entirely in the shops.

Swent: And you enjoyed that?

Boyd: I think I did. Then when I went to Cal Tech we had to spend one summer in the shops. They don't do that today. Modern engineers are not taught to do anything with their hands. They're just theoretical characters, I guess.

Swent: Do you remember anything about your high school teachers that interested you?

Boyd: In England?

Swent: Either place.

Boyd: Well, yes. I remember them very well. In England we lived in "houses." I lived in Crosby House. The housemaster was a fellow by the name of Walker. He was an English master. There's a poem called "The Wreck of the Hesperus"—I can't remember who wrote it--but the expression was, "Ho, ho, the breakers roared." He despised it, so we called him "Ho, ho." He would sound just like this.

The housemaster for the schoolhouse--there were six or seven houses--was my chemistry teacher. Anyway, I put a flame near where I was generating some hydrogen and I got an explosion. I can never forget the day when he got me by the wrist and he taught me that you don't put flames near hydrogen and things like that. He grabbed my arm and that hurt. I can remember that very well.

Swent: It actually hurt your arm?

Boyd: Yes, but not permanently. He was frightened, of course, I expect. They still used corporal punishment there, and the prefects were authorized to punish people. I left my handkerchief out in the change room while I went to play football. I had come out of the dining room at night. We had gas lights then in these days. I would see a prefect standing in the light, and as you came by to go into the commons room, you were sent into the change room. "You left your handkerchief out. Six." You bent over and they would whip the cane smartly across your rear end.

When I went back some years later I learned that they don't do it anymore. I think that's a great shame. I don't think it hurt me a darn bit. It hurt, sure, but I don't think it did me any harm.

The worst thing in prep school that happened to me was when I took the common entrance examinations to get into public school, the housemaster stood over me all the time I was there, and he abused me terribly. "Oh you stupid character," or something like this. And he said, "You couldn't possibly pass all the examinations." And so on.

So I thought I was the stupidest character in the world. It didn't make any difference to me that I got admitted for some reason or other into Oundle school. It was always, "That was because your father was an army officer. You got influence to get in." Or something like that. Every Monday morning, everybody met in the great hall that still exists there. I'll show you a picture.

Swent: This is at Oundle?

Boyd: Oundle. The headmaster would stand up on the platform and the top boy in each class would take up the lists. You have to walk up and hand the headmaster the lists. I got my share of these pickups, so it just didn't occur to me that I wasn't quite as stupid as this fellow said I was. This carried on until I just bulled my way through Hollywood High School without flunking anything.

II CALIFORNIA INSTITUTE OF TECHNOLOGY, 1923-1927

Boyd: Then I got down to Cal Tech and was admitted despite my stupidity. Not only did I pass everything in the freshman year, but I was up near the top of the class. I suddenly realized that I did have a brain. So that went to my head. The first term of my sophomore year I let loose and I really didn't do much studying. We took seven courses, not two or three courses the way you take them at the university today. We had seven courses. I had a warning mark in each one of them on a dreaded pink slip at midterm. A suggestion from the dean that I better come and see him.

So I went in and he said, "What are you going to do about that?"

I said, "Look, this is what happened to me. Don't worry, I'll make it up." I really worked for the rest of the term and made it up.

Well, I didn't make Tau Beta Pi, which is the honorary engineering fraternity, but when I went to the Colorado School of Mines, my friends in the fraternity felt that I ought to be a Tau Bete member, and they wrote back to Cal Tech to see whether they would object to my being put into Tau Bete at the Colorado School of Mines. Cal Tech looked up the history and found that I was only one spot short of my two roommates who were both Tau Betes. So they let me into Tau Bete at Mines in graduate school.

Friendships and Living Arrangements

Swent: Were you in a fraternity at Cal Tech?

Boyd: No. I had two roommates. One was Bill Aultman. He was a Tau Beta Pi. He became one of the great hydraulic engineers that were charged with building the aqueduct into Los Angeles. He got into a company that he became president of, and later chairman. They set up waterworks supply and sewage all over the world.

James Boyd, front left, at school in England, ca 1916.

Graduation from California Institute
of Technology. 1927

Boyd: The other one was much quieter. I remember writing to him once and he said he was working for one of the engineering firms. I asked him what he was doing and he said he was drawing plan views of a rivet. He was a graduate Tau Beta Pi civil engineer from Cal Tech and he was drawing circles. Later on he went to work for the famous brain trust T.R.W.

Swent: What was his name?

Boyd: His name is Roland Phillea. Both of them still live in California.

Swent: You said you lived in a house. Cal Tech didn't have dorms originally.

Boyd: No. They had some fraternities. We didn't get invited into a fraternity.

Swent: Their dorms must have been new at the time you were there.

Boyd: They weren't even there. Well, there was a dormitory there. It was an old military building. I commuted from Hollywood for a while. With the first money I ever earned, I bought a car brand new for $350.

Swent: What kind of car was it? Do you remember?

Boyd: It was a Star Durant open touring car, which with all my training as a mechanic I used to take care of myself. I ground the valves and set the bearings and did everything you had to do with it. I got pinched once for going thirty-five miles an hour.

Swent: The first student houses were built in 1931.

Boyd: That's right. I graduated in 1927. There weren't any houses. We found two rooms connected by a bathroom just off the campus, owned by two old ladies. We rented these two rooms and we put our three beds in one room and our desks in the other room. For three solid years we lived there.

Swent: Where did you eat?

Boyd: We would walk up to the corner and get breakfast, and up onto Colorado Boulevard to get dinner. We used to be able to get a steak dinner for fifty cents. My father gave me $50 a month. I earned—what, $300 a summer? Every summer we had to go to school for six weeks. The first summer we did mechanical drawing and accounting. The second summer we went to shops, and the third summer we went to military camp. So I only had about five or six weeks in the summer to earn enough money other than that $50 a month to go through Cal Tech. Today, it would cost $8,000-$9,000 a year to do that. It's amazing. Is this ten-fold increase a measure of the rate of inflation in sixty years?

Swent: Of course, fifty dollars meant a lot more then than it does now.

Boyd: Yes, but I did not realize that inflation had amounted to ten-fold in sixty years. I help a lot of people through school now, particularly at the Colorado School of Mines. Two or three of them every year get about $1,000 a year out of it. Even at Mines, which is a state school, it still costs them $5,000 to $6,000 a year to go to school.

Swent: But you could do it on $50 a month?

Boyd: Well, nine months is less than $1,000. That was my room and board, running an automobile, and books, and entertainment. And I had a beautiful blonde I used to go with in those days. Her father was a scion of the Ginn Publishing Company. They made the schoolbooks, remember? I think they're still in existence. She was a beautiful, wily one. She married a millionaire later on.

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Swent: So you started out as an electrical engineer?

Boyd: Yes. Then I changed to civil engineering in my sophomore [year]. It didn't make much difference. We all had about the same course for the first two or three years. Because my two roommates were civil engineers I thought that would be a good idea. Then I took one of my classmates up to Ryan with me one summer to get him a job in the plant. He was a mechanical engineer.

We decided together that I would go into mechanical engineering and take economics, and that he would design airplanes. Later on he became a designing engineer for North American Aviation and he helped design the present wing which is utilized by most airplanes today for transport planes. He retired in his fifties. He was a Christian Scientist and became a reader in the church.

Swent: What was his name?

Boyd: Frederick G. Thearle. I got him a job up there in the power plant. The power plant was run by hot head engines that go "Put, put, put, put," all night long. But if it ever stopped putting I'd be up immediately and I would get down and help there, get that engine started again.

Swent: Did the fact that he was a Christian Scientist help your friendship?

Boyd: I don't think so. Bill Aultman was also a Christian Scientist, and his sister was a practitioner and a teacher. I later went and took my classwork with her. But Rollie [Phillco] was very acceptable--it never made any difference to me that he wasn't a Christian Scientist.

Swent: Did you go through a period when your studies with engineering science conflicted at all with your religion?

Boyd: No. It never gave me a problem. In the first place, Mrs. Eddy [the founder of Christian Science] made it very clear that science is a science of mind. What we term material science comes only in the mind. Then you translate it into physical things. I never had any difficulty with it.

Swent: Did any of your teachers ever wrestle with it at all?

Boyd: No.

Swent: They didn't try to shake you up?

Boyd: No one ever tried to change me. They would have had a rough time if they had. No, I never had anyone try to talk me out of it. Not even my wives, neither of which have been Christian Scientists.

Swent: I think of that period in the early 1920s as being a time when this was a very volatile issue, wasn't it, for many people?

Boyd: It wasn't with me. As soon as we got to Hollywood we were entered in a Sunday school. We went every Sunday religiously, all four of us. Then as soon as I became twenty--I was by this time at Cal Tech--I joined the mother church and the local churches, and started teaching Sunday school. I taught there until I graduated.

Swent: In Pasadena?

Boyd: No, that was in Hollywood. I always went home on the weekends. The first Sunday school I had to teach was girls who were just about my age. I thought that was wonderful. They would give me these young movie stars who were hard for women to handle. Somehow a young man could handle them pretty well. Some of them were quite famous. They were child actors. I haven't thought about them for years.

Swent: So that wasn't an unpleasant chore at all?

Boyd: No, I never had any trouble with that. Of course, it meant that I had to study my weekly metaphysical lesson pretty carefully because I had to question them and do what you do in there. This is what guides us [points to two books] so we're all thinking together at that particular time.

Swent: The two books, the Bible, and Mary Baker Eddy's Science and Health.

Boyd: Yes. We always refer to these as our only preachers. We do have lecturers, and we had a wonderful lecturer here this last Sunday, a lovely black lady. She was just as sweet as she could be. Clemmie just fell in love with her. She gave me some great hints about

Boyd: this. That was one of the better things that Clemmie's ever--best that had happened to her. She was raised with doctors all her life. It's going to be very difficult for her to say give up doctors completely and depend entirely on Christian Science.

Swent: Your first wife was a doctor's daughter.

Boyd: Doctor's daughter. She thought that we were opposed to doctors, but we're not opposing them. We have a great respect for doctors doing what they do for people. That they don't do it our way is not our problem. My father-in-law and I were very close friends. I worshipped the ground he walked on, and he never tried to--and Ruthie never tried to--she was even more restrained than Clemmie is about taking medicine and things like that. She never expected me to do all that.

Swent: It's interesting, though, that your friends in college were also Christian Scientists.

Boyd: Well, one of them, so half of them were.

Swent: He had a similar viewpoint then.

Boyd: Yes.

Teachers

Swent: There were lots of very famous people at Cal Tech at that time. Had Richard Chace Tolman come yet?

Boyd: Tolman was there.

Swent: And Robert Andrews Millikan?

Boyd: Millikan of course was the top man. He wasn't ever president. He wouldn't be called president, but he was the chairman of the board or something like that. He still taught physics.

Swent: Harry Bateman?

Boyd: Bateman was there.

Swent: Were you aware that these were great men, or were they great at that time?

Boyd: They were all great to us. I don't remember being highly impressed because few of them were very impressive when you see them that way. I've never been impressed by people. I don't know why. When we get

Boyd: along a little farther we will talk about the people I had to work with when I went to Washington, and particularly when I went to Europe. Then when I came back as director of the Bureau of Mines, I mean, I dealt with some of the great men of the day.

Swent: I was going to say, you've been surrounded by impressive people, your entire life.

Boyd: Yes, but they never impressed me.

Swent: You were born into a whole family of great achievers. Maybe that's why.

Boyd: I suppose I was impressed, because in writing home I would talk about people I met and worked with and so forth. I was a name dropper, I guess. You asked me to be a name dropper and I'll be doing that, because I'm proud of the fact that I've--when we get down to [General] Lucius Clay, for example, I lived with him night and day for four years. Then he went to Germany.

Swent: But you must have been aware that these professors, for example, were achieving remarkable things, weren't they?

Boyd: No, I don't think so. Well, Millikan you would be because he was by this time a Nobel Prize winner.

Swent: Did you meet Einstein at all?

Boyd: No. I saw Einstein, but he came after I left. In fact, I was going over to Cal Tech one day when he was there and Mother said, "Wouldn't it be wonderful if we'd see Einstein?"

We pulled up in front of it, and who walked across the street in front of us but Einstein. I've heard lots of wonderful stories about him, and of course I knew he was of great mental capacity. But the difficulty of Tech, even today, the faculty are all so highly respected in their fields that you're used to it.

Swent: It's just the norm.

Boyd: Yes.

Swent: And the students, of course, were all of that capacity also?

Boyd: That's right. I suppose that makes me that way, because after all, when they came to get me in the Tau Beta Pi at the Colorado School of Mines, they went back and found out I had only barely missed becoming Tau Beta Pi and I had no idea I was anywhere near that level. I just thought I was still one of the stupid people. All I knew was I had enough points to graduate.

Swent: Did your managerial talents show themselves at all at an early age?

Boyd: Yes, I think so, because I can remember thinking that I would like to be a president of a copper mining company. I can remember it now. I never realized how I would get there or whether I was trained to be there. Why would I go after it? It came to me. I didn't go to it. And I was a crew chief within a year from graduation.

Choosing Between Flying and Geophysics

Swent: But this was something you had thought of?

Boyd: That's right, because then, when I talked to my friend, Fred Thearle, we decided that he would go on doing the designing of airplanes and I would become a businessman and I would learn to fly. The reason that we didn't go on with that is that my mother didn't like this idea of my going to learn to fly because in those days of the people who entered these flying schools, less than half of them came out alive, something like that. If they didn't come out alive they were washed out because they couldn't fly well.

So I got admitted to this Army Air Force flying school in Texas. If I was going to do what we had planned to do, he would design airplanes and I would fly them, and we would get into the business of building airplanes, this was just a matter of course. I had a course in engineering and economics, mechanical engineering, and he was a mechanical engineer. He was a Tau Beta Pi, too.

Swent: Was this after graduating?

Boyd: This was on graduating. Of course, I passed the physicals all right. I could see straight, and my Cal Tech degree seemed to be enough; they didn't need to test me on that one. So I was admitted. My mother fell to work on this fast. She didn't like this idea at all, so she went and worked on their friends in the mining industry, and I got a wonderful job offer to go to the Radiore Company, which was in the beginning of the use of geophysics in mining exploration. They talked me into giving up this flying school and going out taking a job in geophysics.

Swent: Who talked to you?

Boyd: My mother, my father, and the vice president of the company.

Swent: On what basis did he influence you?

Boyd: Well, they showed what job I could do, and what I would get paid and so forth. Don't forget, Dad never had a very big salary. I don't think his salary was ever over $7,000 or $8,000 a year. He had three more children to educate, so I was on my own. They offered me $200 a month. That was a lot of money in those days.

Swent: At that point were you thinking of getting married?

Boyd: We weren't thinking about getting married.

Swent: But you still needed the money for yourself.

Boyd: Yes. And I saved up most of this money and put it in stock in the company. Out in the field we were fed in the field and transported. I didn't need many clothes. I worked in the field in just one suit. We didn't drink much, so-- [laughs]

Swent: Where did you go with Radiore then?

Boyd: The Radiore Company was a subisidiary of the Southwest Engineering Company.

Swent: And they were headquartered in--?

Boyd: In Los Angeles. The man I knew was of Swedish origin, Henning Olund. His wife was a real Swede and a great friend of my mother's. She was a Christian Scientist, too. I don't think Henning ever became a Christian Scientist. I traveled with him a lot later on.

This was Dad's industry. I had been up in the mining industry all my life, or associated with it, and my mother worked pretty hard on me not to go flying. As a matter of fact, the class that went down there, I don't think more than twenty percent of them survived the course. They either got kicked out or they were killed. What would I have been doing? I would have been flying airplanes from there on. I don't know.

Curriculum

[Date of Interview: October 18, 1986] ##

Swent: I would like to know a little more about what you think Cal Tech's philosophy or approach to education was at that time? Now that you've had experience with other institutions, what was distinctive about Cal Tech?

Boyd: I think the most distinctive thing about Cal Tech was the realization that you had to train somebody not just to be a scientist, or an engineer, but to be also a citizen. The breadth of the courses was such that we had, besides mathematics, chemistry, and physics, we were required to take the basic courses in literature and English. In current events we even used--what is the weekly magazine--Time. Time magazine was relatively new, and was our textbook in current events. It wasn't long before I gave that up because I never enjoyed the fact that they editorialized the news. I haven't really studied Time since that time. But at least in those days we were required to be well aware of what was going on in the world.

Swent: And that was rather different for a technical school?

Boyd: Yes, as far as I know. I didn't know any other schools, of course, but as I went on later to the Colorado School of Mines, we had much greater difficulty getting those kinds of courses into the curriculum, and they had them well established at Cal Tech. For instance, we took from seven to nine courses a term. We had three terms in the year, and besides our chemistry, our physics, and our laboratory courses, we had to have these--what do you call them?

Swent: Humanities.

Boyd: Humanities. The humanities courses went along with it.

Swent: There were three terms and then your field work in the summer?

Boyd: There were three terms a year. Then we had the long summer period in which, at the end of our freshman year we took shop. We had to do machine work or lathe work, and carpentry, and pattern making, and things like that.

Swent: And that was on the campus?

Boyd: No, it was in one of the high schools. We didn't have the shops on the campus, but we were sent off there in the summertime. In the end of the second year we came back and we did mechanical drawing, engineering drawing and accounting.

Extracurricular Activities

Reserve Officers Training Corps

Boyd: At the end of the junior year we went off to military camp because I had agreed to sign up for ROTC even though at that point I was not a citizen. Until my father became a citizen they couldn't pay me the

Boyd: $75 a month, or whatever it was. But I nevertheless took it because my father felt that I should be prepared to defend the country that I lived in.

Swent: It's interesting that his terrible war experience at Gallipoli had not turned him against military service in any way.

Boyd: That's right.

Swent: And you were still enthusiastic about joining the army.

Boyd: Well, he had a big influence on me.

Swent: Was ROTC a big thing at Cal Tech?

Boyd: In those days ROTC was a big thing. Not everybody, of course, took it. You weren't required to take ROTC. Until Dad became a citizen they couldn't pay me. I just enrolled. When he became a citizen before I was twenty-one, then I became automatically a citizen and they were able to pay me.

Swent: And were most of your friends also in ROTC?

Boyd: No. Bill Aultman wasn't there. I don't remember if Phillco was or not. I don't remember what proportion of the student body, but it must have been about a third of the student body which was in the ROTC. Then they graduated as second lieutenants in the Corps of Engineers.

When we had the final parade in which we were given our commissions, I was asked to be the adjutant and read the orders of the day. That was the first time I realized that I had a bellowing voice that could be heard all over the football field. And I guess that's still true. Maybe people don't understand what I say, but they can't ever say they didn't hear.

Swent: Did you rise in the ROTC? Was this choice as adjutant because of your administrative experience?

Boyd: Well, I graduated as a second lieutenant, and I had been a platoon commander while I was there, so--

Swent: So you had already come up?

Boyd: Yes, up there. Did I mention yesterday that I kept my military training up?

Swent: Yes, you did.

Boyd: When the war came along I was a senior captain and was called in as a captain and I went to Washington.

Swent: This meant that you had gone to camp every year?

Boyd: I had gone to camp two or three times at the military camp in Colorado, Fort Logan. I had been to a military camp at Fort Lewis, Washington in my junior year.

I did a lot of paperwork. There were courses sent to you for you to study and write reports on. In fact, I sort of became the professor of military history. I had to know more about the Civil War and what's going on, and what the effects on the organization were during the Civil War. I've forgotten all about it now, but I used to correct the papers of those who took that course. That's the kind of thing that kept me in touch.

Swent: How did you happen to be chosen to correct those papers?

Boyd: I haven't the faintest idea. I was just asigned the responsibility, I guess.

Swent: You must have had some talent that caught somebody's eye.

Boyd: I suppose so. Or they couldn't get anybody else to do it.

Swent: What was your motivation for staying active in keeping this up?

Boyd: Well, I think my father made it clear to me that it was my duty to serve my country.

Swent: You could have just stopped after graduation.

Boyd: I could have done, yes. But I never did that. I always kept up with what I did, I suppose. That's the reason. It was a good thing I did, so when I got to Washington they could give me a job on the staff.

Dramatics

Swent: What other extra-curricular activities did you have at Cal Tech?

Boyd: Well, I took part in the drama club, and we put on plays. There is a theater in Pasadena, the Pasadena Playhouse, in which a great many movie stars were trained before the days of the talking pictures. I would go over there occasionally and take small parts in that. Gilmore Brown, who was the director at the Pasadena Playhouse at that time was also our coach in the plays, in the drama club.

Swimming

Boyd: Also, I swam. My father had thrown me in the Pacific Ocean when I was three years old and said, "You'd better swim; there are sharks in there." That's what he told me. I don't remember that story. But I've swum all my life, and I competed in school in England. Therefore I was on the swimming team and ended up by being the manager of the swimming team in my senior year. The yearbook says that I was the support of the swimming team. I guess I swam about as many races as I could take. But I wasn't very good.

Swent: Really?

Boyd: No. Just good enough to win a few medals.

Swent: And I think you still love to swim?

Boyd: Oh yes. I've swum ever since. I still swim. But I never was coached. We never had a coach at Cal Tech. We went and swam on our own up at the junior high school pool and at the YMCA, but we didn't have a pool in those days. Now Cal Tech, with some of my money, has got a good swimming pool. Their team is better. But my last year we beat UCLA, so we weren't too bad.

More About Professors and Studies

Swent: Did you have contact with your professors outside of your classes?

Boyd: Oh yes. One thing about Cal Tech--and this is very important--your professors were always available to you to help with personal problems. Professor Graham Allan Laing was my professor of economics and business administration. We never called him anything but "Professor Laing." We weren't on a first-name basis in those days. He regularly every term would have meetings at his house where his wife put out the cookies and we would sit and discuss economic questions.

Dr. Millikan had us in to tea or cookies, or whatever it may be, at least once a year.

Swent: And these are the two fields that you were most interested in?

Boyd: Well, Dr. Millikan was the head of the school.

Swent: Economics and mechanical engineering.

Boyd: Mechanical engineering, yes.

Swent: Physics was not your major.

Boyd: Oh no. Heavens, I had a hard time getting through physics.

Swent: But geophysics became--

Boyd: Geophysics came to Cal Tech after I had left. I had no training in geophysics except in geology. We were talking about the Cal Tech professor who became the head of the California Division of Mines and Geology, Ian Campbell. He was my professor. I got to know him quite well, but the head of the department was then John Buwalda.

I've got a gold-headed prospector's pick up there on the wall behind the gold pan. On my fiftieth anniversary of graduating from Cal Tech I was apparently the oldest living geologist as a graduate of Cal Tech, although I didn't graduate in geology at Cal Tech. I had become a geologist in the meantime, and they always made a fuss of me when I went there. I've got great friends in the department still.

Swent: You should say that you were given the distinguished alumnus award from Cal Tech.

Boyd: Yes, but because of my economics, my business, not necessarily because of my engineering contributions, although I guess I've made some or I wouldn't have been elected to the Academy of Engineering.

Swent: You've always had a broader outlook than just the science and engineering.

Boyd: That's right. Cal Tech very carefully trained us in breadth, not being tied down to a particular field. While we had to pick a discipline like mechanical engineering or civil engineering, we were expected to broaden our whole outlook.

The professors have always been well chosen at Cal Tech. They're proud of the fact that the Academy of Sciences and the Academy of Engineering have a large component of Cal Tech professors, either before they came to Cal Tech, or while they were there they earned those honors.

Swent: And these have frequently been men of multi-disciplinary talents.

Boyd: Yes, I think that's true because without that they wouldn't get appointed. Linus Pauling is an example. His son-in-law, now provost at Cal Tech, was a member, then head of the geology department, Barclay Kamb. He with Leon Silver and Robert Sharp have been good friends for years.

Boyd: Arnold Bechman was my instructor in chemistry. So I was one of his first students. Few men have matched his eminence in science, industry and support of the scientific institutions. I am sure that I was influenced by his example and enjoy seeing him when we meet on the campus or at meetings of the Cal Tech Associates.

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Boyd: One of my roommates, Roland A. Phillee, designed the civil engineering functions for the construction of the Palomar telescope in southern California. He took me into the laboratory. I saw them polishing that mirror that time. But I had nothing to do with it.

Swent: And your interest in aeronautics has not continued, has it?

Boyd: No. I haven't had any great interest in it. Although my fourth son Hudson was a flier and chairman of the Point Lobos chapter of the American Institute of Aeronautic and Astrophysical Engineers. I've had a lot of friends who have been involved in it in the manufacturing end, the research end, but I've never had any particular connection with it, except to fly in my work.

Swent: You've certainly done a lot of flying, yes. I just made a note of some of the Cal Tech people. Did you have Theodore von Karman? Did you study anything from him?

Boyd: No. I was aware he was there, but I didn't have anything to do with him.

Swent: Tolman, you said, taught one of your classes, physical chemistry?

Boyd: Physical chemistry, yes. I got my physical chemistry from him.

Swent: Was there any professor that particularly influenced you? Professor Laing perhaps?

Boyd: Well, Laing, of course, had the greatest influence on me, and Millikan gave me my basic physics. I had to take hydraulics, and the professor who wrote the book from which we worked, we had to check him on the answers in the back of his book. We found some errors in his book. But he was a very prominent hydraulic engineer in the engineering societies, and he would be gone a large part of the time, so we were lectured to by fellows.

The professor of aeronautics--I did take aeronautics--I will always remember him. I can see his face and I'll recall his name. One day he produced the formula for the air foil in the wing of an airplane. It went clear across the board and then he wrote the answer at the bottom. He turned around. My eyes were wide open. He said, "Didn't you follow me? I just changed to polar coordinates and integrated." It would have taken us all day to change to polar

Boyd: coordinates and another day to integrate it, but he had done it in his head right there. I didn't do very well keeping up with that kind of mathematics.

Swent: Did they have a lot of laboratory facilities?

Boyd: Oh yes. One of my professors who was quite famous in his field was Royal Sorenson. He was the head of the electrical engineering department. He came from Golden, Colorado, where I was to go later. His daughter was a beautiful redhead, and she was the belle of the campus. She married a man who was a senior when I was a freshman, Peterson. He's done well in the state of California since then, in the electrical end. But I always looked up to him as being my hero. In those days, the seniors wore that hat that the rangers wear, the flat, hard hat. So I wore mine when I was doing field work for a long time until it wore out. When you got to be a senior you got to wear the hat.

In those days we used to wear plus fours [knee-length pants]. I have pictures of me in those days showing me in plus fours. Then, you know, we used to have quite a little rowdiness at the universities. One of the worst things was they would get us all lined up as freshmen to get a picture taken, and the sophomores would be up on that balcony above and then dump water on us until somebody let a barrel of water slip out of his hand and almost dumped it on somebody's head. That put an end to it.

Swent: Cal Tech has always been committed to being a small institution.

Boyd: That's right. It isn't much bigger now than it was then.

Swent: This meant a greater closeness to your professors.

Boyd: You knew your professors pretty well. They mixed. We went to their houses, and they were always open for us to go to.

The Honor System

Boyd: One of the great things about Cal Tech was, I think, the honor system. When we went in to take an examination we could take all the books we wanted to in there. The only thing you didn't do was ask your neighbor. You swore to the honor system and you didn't crib or you didn't do anything like that. In fact, you could take your examination home and work at home, and bring it back before the hour was over. I did that once. I don't know why. Of course, I almost flunked. We used to leave slide rules and books on the steps while we went to another class. We were very careful about that, and we guarded the honor system pretty thoroughly.

Boyd: Of course, we were allowed slide rule error. You always carried a slide rule. Today, Keeffel and Esser [manufacturers of slide rules] even turned over the machines that make the slide rules to the Smithsonian Institute. The electronic calculator and computer have replaced it totally.

III WORKING AS A GEOPHYSICIST

Radiore Company Crew Chief in Canada and Utah

Boyd: The next period is when I turned down the air force. They can never understand why I turned them down. It was because I got a job with the Radiore Company, and we went immediately in the field. I was trained in the deserts of California and then moved to eastern Canada to work under an older man who couldn't stand the cold. When the winter came in the backwoods of Canada he had to go home. I suddenly became, at the tender advanced age of one year beyond college, a crew chief.

Swent: Where precisely was this?

Boyd: This was up in northern Quebec in eastern Canada. We were doing electromagnetic prospecting.

Swent: Which was brand new at that time?

Boyd: It was brand new, that's right. Our particular machine had been developed by a man within the Radiore Company. What we had was a great big wire coil, a square coil, mounted on a frame, which could be folded to carry over a man's shoulder.

Swent: By great big, you mean four feet square?

Boyd: Six feet on the side. I think they were that big. Then you had a generator to produce an electric current by manually cranking it. Later on we activated the generator with a lead battery. This gave a more constant signal. In that cold weather the batteries didn't last long and had to be charged overnight. By the time we got to Canada, however, we had gotten away from the mechanical hand-cranking mode.

Swent: You trundled this thing along the ground?

Boyd: No, we carried it on our backs. By the time we got to Canada we had to carry these fifty-five-pound electrical batteries. We carried them on a tump line over our head on our back. If you had to crawl across logs in the burned-over area, the strength of your neck was tested; we all got pretty strong necks.

Swent: What did this register?

Boyd: What we did, we really generated a current which, passing through the large coil, produced an electromagnetic field. If there was any electrical conductor in the ground it would distort that field. We could measure that field by taking a transit or surveying instrument mounting two coils on the trunion or axis. You knew the shape of the magnetic field being transmitted, and that coil was pointed directly at you--we had to make lines through the forest and line up that transmitter with the receiving instrument.

Swent: You had two people?

Boyd: We had a receiver and a transmitter. There were four of us usually on the crew. The man operating the receiver would put the earphones on. By turning the coils and listening to the loudness of the signal he would record the reading on the transit at the highest level of the sound. This would indicate the direction of greatest distortion of the transmitted signal. Then these records in the notebook were plotted on the map and geological indications determined. This same system simplified today is used for locating water or gas lines and buried treasure. We had been practicing this in the southwest where the ground is dry and any conductor at all was not very easy to pick up. When we got into Canada where the ground is wet, these signals were more definite. Even a little seam of pyrite would be easily detected.

Swent: Was there a variety of metals that you picked up in this way?

Boyd: Yes. We were searching for minerals such as galena, the sulfide of lead; chalcopyrite, the sulfide of copper; and the sulfides of nickel. But pyrite, the sulfide of iron, was plentiful but not much use in this context. The actual content of the conductors could only be determined by drilling with diamond drills. This followed the geophysical mapping.

We were looking for geological anomalies rather than metals. We had to interpret those to determine whether they represented veins or they represented an ore body, or whatever it may be. This process is called the electromagnetic method. That was the Radiore Company's principal tool. We could trace fault planes very clearly as the broken rock in them usually contained water and thus conducted electricity. Thus we could see through the wet underbrush in the forest what the structure looked like underneath. This was the thing to be done in those days, so I hadn't been there more than

Boyd: four or five months working in a laboratory in vain to help build the equipment. We had to import the little peanut radio tubes. There weren't any produced in this country. The transistor hadn't been invented yet.

Swent: Where were they imported from?

Boyd: Canada. I don't know how they got there, but we were supplied with them. If we had any trouble with the electronic box mounted on the transit we used to bang it with our hands to fix it.

Swent: You were constructing these things as well as--

Boyd: I had to construct them in the laboratory before I went out so I knew what to do with them when I went out in the field. I could fix a circuit, and I knew how to solder, and check out to see whether the resistors and the condensers and so forth were working all right.

Swent: When you then ended up as crew chief in northern Canada, you worked there through a winter?

Boyd: Oh yes. We lived the winter in northern Quebec. There were not many hours during the day that you could see. We were up quite far north, and the temperature would drop to fifty and sixty below zero.

Swent: Did this affect your recordings to have the temperature change?

Boyd: Do you mean the electrical? No. We could read through the snow. It was easier to work in the winter than it is in the summer because you wore snow shoes and you stayed on top of the snow. The snow didn't interfere with the penetration of the magnetic field. Then we would drive stakes into the ground through the snow where the conductor manifested itself. After the snow melted, the brushed-out survey lines and the electrical conductors marked by the flagged stakes were still visible. French-Canadians cut lines through the forest and surveyed them. We knew where we were and then we could approximately know where the survey points were--have a transmitter going along one line and the receivers on another. You had to go and do all this by survey in advance and know exactly where you were.

Later on when I had been returned to the U.S. we were working in the lead-zinc-silver mines in the Tintic district of Utah. We took the system underground. Production from these mines was done by leasing sections of the mine to groups of miners who worked them under lease. In reaching for ore bodies and in order to save the cost of hoisting waste to the surface, they would mine very small access drifts. These were mostly mapped, but not all; we had to crawl through them on hands and knees carrying our equipment, usually with a carbide light in our miner's hard hats. We would set up the transmitter in one entry and point it toward a surveyed point plotted in another. The power was turned on at specific times and

Boyd: the receiver would be set up at that time and place and readings taken. The electric fields would be distorted by sulfide mineral ore bodies. Once we were satisfied that we had found such an ore body, only to find that most of it had been mined out by the leasers, probably years before.

Swent: Was Radiore contracting?

Boyd: Yes, Radiore was a contracting, consulting firm. They would go out and contract to do this work and then provide the company that paid for it with the maps. We had to be very careful about it, paticularly in Canada, because if one of these maps would get out, or you would talk out of term, the stock market would begin to be affected. You had to be very, very careful.

Swent: And you were told this?

Boyd: Oh yes, sure. It was made pretty clear to us. I became a crew chief before I had been with the company a year. I was still only twenty-two, or something like that. So I've been a boss all my life, a boss of something, until I got here and Clemmie took over. [chuckles]

Swent: So then you were with Radiore for a couple of years?

Boyd: Yes. Let me see, about two years. 1927-29. I was called back to Los Angeles to prepare to go to Russia. On the way I took the train across northern Quebec to Vancouver and a ship down to Los Angeles. I went in to see the boss with fear and trembling for taking all that time off. He said, "Did you stop in Lake Louise and Banff?"

I said, "No, we didn't have time for that."

He said, "Oh, you ought to stop and take a day or two and see that along the way. You ought to see the elephant as you go by."

So instead of getting bawled out I'm chided for not taking a little more time. I was to prepare a crew to go to Russia.

Swent: Who was your boss?

Boyd: His name was Henning Olund. The electrical equipment was designed and built by J. J. Jackowski and the theory developed by him. He was the research director.

Swent: So you were going to go to Russia?

Boyd: I was ready to go on the crew to Russia but we had to wait for the contract to be completed. Later, at the end of a very unsatisfactory contract they were sent home without their equipment. I was brought down from Canada to prepare to take that crew to Russia, and I was staying at home in Hollywood in the meantime.

Boyd: While waiting I was sent to New Mexico to join a crew led by Wesley Nelson, who later became an assistant director of the Reclamation Bureau in Washington. The western crews usually traveled in Marmon open cars with the big transmitting coils strapped on the back and batteries and electrical equipment on the running boards. What little baggage we had was piled into the back seat with us.

We were assigned to study a potential copper deposit about halfway between Santa Fe and Albuquerque. Nelson and his wife traveled in a separate car. We arrived at the campsite on a cold snowy evening. We crossed an ice-covered shallow stream to a small intact cabin, and a large dilapidated building, one end open and the floor fallen in. We had a camp cook along so we shored up the floor and set up the cook stove, spread a tarpulin over the open end, and set the cook to getting dinner. We all were in cold misery.

I seem to remember saying, "When we leave here in a month or so we will feel like leaving home," and it was so, for we would spend alternative weekends in Santa Fe and Albuquerque. There was a big pipeline abandoned in the stream bed—it showed up very nicely on the equipment--but we did not find a significant ore body.

Swent: Was this when you saw Colonel Charles Lindbergh?

Boyd: It is possible that I had seen him when we went on the Aero Club trip to the Ryan plant in San Diego my senior year. That was in the spring of 1927. They were building the Spirit of St. Louis and we watched them at it. As he spent quite a little time at the plant during construction it is possible that he was there, but nobody had heard of him. One day while coming into Albuquerque by train I got off to walk up to the Alvarado Hotel, and I recognized him getting off ahead of me. I followed him to see how many would recognize him after all the publicity he had been getting. There was no sign anyone gave that they had for that three or four blocks.

Swent: It appears that this period with Radiore was a significant one for you.

Boyd: The work in the field with the Radiore Company was interesting and sometimes quite exciting. We were after all contributing to the application of new physical knowledge to the art of prospecting for mineral resources, the basis of all manufacturing industry. The day of the surface prospector was coming very close to the end. The geologist with his knowledge of how mineral deposits were concentrated in the earth's crust could search for surface indications but he needed to be able to look below the surface to expand the necessary inventory of his ideas. Oil is concentrated in nature by stratigraphic traps; the seismometer was not able to locate oil directly, but it can determine where geological conditions could trap or concentrate oil in the rocks. We, on the other hand, were engaged in using the behavior of electricity to

Boyd: determine where bodies of minerals buried in the rocks would have the electrical characteristics to indicate the presence of bodies of ore. Much of the experimental work done with the Radiore equipment was done near Darwin, California. The office was in Los Angeles.

Amusements

Boyd: On my way across Canada there were three very lovely girls who were members of the Albertina Rashe Ballet. The four of us would play bridge and eat together. Then when we got down to Hollywood I still wasn't ready to go to Russia and was filling in time working in the lab. I used to go with one of these girls, and I found out she was Albertina Rashe's second in command. I would wait at the stage gate to meet her. But Mother was scared to death I was going to marry a chorus girl. I think she figured that I was a little young for her. They were doing choreography for "The Hollywood Scandals of 1928."

Swent: Bridge is something you hadn't mentioned yet. You learned to play bridge somewhere along the way.

Boyd: Well, my mother always played bridge. She taught me how. I never was a very good player. I played at it. We played bridge and poker in the camps in Canada because after all there was little else to do in the long nights in tents at forty to sixty below zero. Being with these people I would have a beer or a glass of wine with them. Usually I ended up by having to carry someone who overdid it to bed.

Swent: I was going to say, some of those places have a reputation of being pretty hard-drinking outfits.

Boyd: That's right. There were some people who were. I'll never forget, we had a Scotsman, a Canadian Scot. We had to carry those long poles so we could see through the woods. One day he tripped over some logs he had to cross. He picked his pole up and he looked at it a minute and said, "You three-masted bastard" in a Scotch accent. I once had to dig him out of a snow bank in Rouyn and put him to bed.

Swent: Did people tease you because you weren't a drinker?

Boyd: No, because I didn't make it obvious.

Swent: So how did you happen to leave Radiore?

Boyd: Well, when the end of the second year came and it became obvious to me that if I was going to be a geophysicist that I had better be trained as a geologist.

Swent: And you did enjoy the field work?

Boyd: Yes! The Radiore association ran from the spring graduation of 1927 to the fall of 1929. Following the year in Quebec and Ontario and the return to California I was assigned several stints with various crews; some I led and others with more senior members of the staff. We worked in Idaho with Dr. Anton Gaudin in the lead-zinc districts of Idaho; in the copper mines of Butte with Anaconda staff and with Reno Sales, their great geologist; the Tintic district of Utah with Paul Billingsley, the great consulting geologist. Billingsley once said, when we were still hand cranking the generator on the transmitter, "When you can turn out the stock returns on that machine I will believe it works."

IV GRADUATE STUDY AT THE COLORADO SCHOOL OF MINES, 1929-32

Boyd: It became obvious to me that if I was to continue in geophysics and mining that I should become better trained in the fundamentals of the geological and geophysical sciences, that I should enter a graduate school somewhere. Returning to Los Angeles I stopped in Denver and visited the Colorado School of Mines in Golden. I was introduced by the two or three graduates that I had been working with. I was granted a fellowship and entered in the fall of 1929.

I left the employ of the Radiore Company in September 1929. I had used a little of my $200 monthly salary to buy stock in the company. As I remember it I had about $200 in cash when the Depression descended on us. The company soon went out of business, but the Colorado School of Mines took me on as a teaching fellow for $75 per month. Some kind neighbors rented me a room for $15 per month. You can bet that I kept track of every cent. I still have a little book in which I kept track of those precious pennies.

My superiors were the head and faculty members of the geology and geophysics departments. The first term I acted as a laboratory assistant in the freshman geology classes. That term I began taking all the courses in geology that I had not taken at Cal Tech such as mineralogy, petrology and structural geology. I completed all the required courses as I took on a fairly heavy teaching load, in mineralogy, freshman geology, etc., to complete my work for a master's degree in geophysics in 1932. In August of that year I was fortunate enough to marry Ruth Ragland Brown. I was initiated into the Alpha Tau Omega fraternity in 1930 and elected to the office of worthy master in 1931. By 1932 I had completed all the required courses to earn my doctor of science degree in 1932 in geology.

The only place to really get this training in geophysics was at the Colorado School of Mines under Dr. Carl Heiland, who was the head of the geophysics department. About the time my father was ready for college, Grandfather decided to move to London. Father had a friend a year older who had decided to go to the Colorado School of Mines, and Dad wanted to go with him, but his father, my grandfather, put his foot down and said, "No, if you're going to be

Boyd: a mining engineer you go to the Royal School of Mines in London." Years later when I was in Golden, Dad and I studied the pictures of graduates. His friend was one of the two who graduated about 1898.

Swent: What did the students call you?

Boyd: They called me anything from Jim, Buck, Doc, when I got my doctor's degree, as long as they didn't call me late for breakfast. They all had names for me.

Swent: Buck Boyd seems to be a rather common nickname for you.

Boyd: The Buck Boyd came because I got tired of them not carrying on their work in the mineralogy class, and so I gave them a real stiff quiz. And when I came into the fraternity house for lunch, somebody in the back of the room said, "Buck Boyd rides again." Jack Benny, at that time, was talking about Jack Benny rides again. So that's where I got the name from. That whole generation in school called me Buck—still do.

Then the lady who I lived with next door to the fraternity house, where we built a new fraternity house, when I became the worthy master, was a great friend of Dr. Harry C. Brown. She taught school, the Randall School in Denver, with the doctor's daughter. And she brought her out, and I saw this very lovely lady with a great big hat on at the dinner party, and that's where I fell in love with her. She drove a Cadillac, and I had to come in the streetcar when I took her home in Denver.

About three weeks later I took her to a ball at the military camp south of Denver where I used to keep my commission up to date. I saw the attention she was getting from other men around there, and I took her outside, and said, "You know, I'm going to marry you." [laughs] I scared her to death. But I think she finally fell in love with me because we were married a year later. That's how I came to know Ruth. She was teaching school, in her aunt's school, and continued to teach after we married, because teaching school there permitted her to go and carry on her social affairs as well as her teaching affairs.

Swent: And she liked to ride?

Boyd: She had been born in the saddle. They had horses up in the mountains. They had a house at Evergreen, and all the time she was in school, they would go to Estes Park for the summer. I hadn't been much of a horseback rider. I had ridden as a child, but we went on one of these trips one day, on horseback, and I got a horse with a very stiff leg. And I was pretty tired before I got halfway home. She took the horse over, and she thought she'd lost me. That's the only time I ever saw her in tears. [laughs]

Lewis and James Boyd. Early 1900's

Lewis and James Boyd with twin sisters.

Left to right: Hudson, James, Douglas, Ruth, Bruce, and James Brown. Early 1950's.

Boyd: But from there on, we were pretty close, and I would go into Denver on the streetcar. I didn't have a car then, until I got a job with the Geological Survey doing some mapping in the summertime, and I had to have a car, so I bought my second car.

The United States Geological Survey maintained an office in the basement of the National Guard building in Golden. I would spend some time with the members who worked out of that office, particularly Edwin Eckel, who later became executive secretary of the Geological Society of America, and Thomas S. Lovering, who gave me a job first to help him finish a map of the Nederland tungsten district in Boulder County, Colorado. That was in the summer of 1933, the first of my new married life. The Loverings with their son Tommy and Ruth and me. We hired a Texas school teacher to cook and maintain a cottage in a lovely dell in the Colorado mountains.

The men and Tommy worked from sunup to sundown mapping the geology, and evenings plotting the work on the maps. That would be seven days a week until the ladies rebelled and we would take Sundays off to attend such things as the Central City Opera House. The government employees had had to take pay cuts as the government's income had materially reduced in the Depression. I had been hired as a rodman instead of a geologist. The year before I had been sent out in my own car to fill in some of the gaps in the new geological map of the U.S. being prepared for the international geological conference to be held the following year.

In the summer of 1930 John H. Wilson had hired me to survey with the magnetometer the countryside around Wichita, Kansas, to allow him to appraise the possibilities of finding oil. I would be out in the field before sunrise driving from one predetermined location to another, set up, take the magnetic readings and return out of the heat of the day to the local swimming pool. Then visit with local company offices to borrow well logs. Then spend the rest of the evening plotting the readings.

When I was later having trouble with the Senate over my confirmation to the directorship of the Bureau of Mines, John was one of my staunchest supporters, getting many people to write supporting letters.

As I was now working hard to complete my work for the doctorate, I became closely associated with Ben H. Parker and John D. Marr, both candidates for doctorates. Ben and I were later to become partners in the consulting firm of Parker and Boyd until I went off to war. John went into the practice of geophysics. Ben and I would relieve each other in our teaching assignments when consulting work would appear.

Boyd: At another time I had received a contract from the Reclamation Bureau to study the groundwater water table in the Belle Fourche Dam in South Dakota. It was an earth-filled dam, and the design of the dam had to provide that the water table was brought down below the top of the dam. We could determine how deep the water table was by making these electrical currents float. Thta was my first contract with the resistivity, which we used in mining for research later on.

The practice of geophysics required the use of scientific equipments that were constantly changing. I took a part-time managing position with B. E. Moritz Jr., an electronically trained man from Massachusetts Institute of Technology. We called it the B. E. Moritz Instrument Company. Bert had been doing work with the research doctors at the Colorado University Hospital in Denver. We patented a "Poly-electro-physiograph" to concurrently display visually and audibly: cardiograms, muscle currents and heart beats which could be simultaneously seen and heard in the hospital lecture rooms. These required the use of the new cathode ray tube which was to become the basis of radar and TV.

We designed and built our own instruments for measuring the resistivity to the flow of electric current in the ground for use in my consulting work. If I needed equipment to read natural currents in the ground which can be produced by certain geological occurrences associated sometimes with ore bodies, I could borrow some that John Wilson had available. On one occasion I was able to help the American Smelting and Mining Company expand an ore body west of Denver. On another occasion Ruth was my only helper, my "four-man crew." She would lift a heavy sledge hammer to drive iron stakes into the ground.

Later I was asked by the city of Grand Junction to study the geology involved in a lawsuit. Ben covered my classes while I was preparing for and testifying in court. By this time I was teaching economic geology.

I kept no diaries in those days so the exact dates may escape me. I arrived as a graduate student in the fall of 1929. Then the next two years I spent in intensive work to catch up with the basic courses in geology and geophysics and so on. I am not sure when I went on the payroll, but it started as a teaching fellow in the freshman courses of map reading in the laboratories, and proceeded through instructorship, assistant professor to full professorship, after my becoming a full professor of economic geology (meaning the sciences involved in the search for and extraction of mineral resources). I was married in August of 1932 and moved to Denver that year where my wife was teaching school. I was able to suplement my small salary, even as associate professor, with outside jobs and consulting work. The formation of the B. E. Moritz Company was financed by our own money and some sales of stock to family and friends. We were beginning to build various markets. My father-in-

Boyd: law loaned us an old house on a vacant parking lot in downtown Denver to work from. This all came to an end when I got called into the army and Bert left for Houston in early 1941. The company was a total loss for all of us.

I did not become a dean until I was enticed out of the army by the offer. The beginning of the army career forced me out of teaching and technology development and into administration. Sixty-four years have passed since I began intensive training and worked; forty-six of them were in administration.

Teaching Economic Geology

[Date of Interview: October 18, 1986] ##

Swent: This is Saturday afternoon now, October 18th, and we are continuing the interview with James Boyd. Going back a little bit into your Colorado School of Mines experience, could you give me first of all a definition of economic geology?

Boyd: An economic geologist's major interest is in the search for new mineral deposits and for the production of the raw materials required in the economy. Any studies of rocks which lead to the discovery of new minerals and the production of the required amount of minerals is referred to as economic geology.

If you're dealing with just plain geology, seeing how the mountains are formed and so forth, you call that structural geology. Economic geology is dealing with the minerals that are basic to the economy. Those are the two things.

Swent: So this now pulls in your major interest, doesn't it?

Boyd: That was my major interest in the Colorado School of Mines because, although I did teach petrology and mineralogy and historical geology, my major interest at that time, at the time I was leaving, was in the economic field. I had a predecessor who I worked with, Bill Hewlett. He was teaching economic geology when I got there. Then he left the department, and I took the position of professor of economic geology and began to teach it there. So I learned most of my economic geology from him, really.

Swent: Were you teaching undergraduates and graduates both?

Boyd: I had very little to do with graduate students at that time. There weren't many graduate students in economic geology there. Ben Parker and I were probably two of the few that were there. While I was teaching, I was still getting my education.

Swent: Did you do a special project or dissertation for your doctorate?

Boyd: The thesis for my doctorate was "The Economic Geology of Colorado." Later on, when I had ninety geologists working for me, one went back and read it. I wasn't very proud of it. [Laughter] There had to be a lot better jobs than I wrote. So I don't think it was any great contribution to scientific literature.

Swent: Was it used by any of the Colorado companies that you know of?

Boyd: Not that I know of. One of my associates who was killed in an airplane accident had his home in Golden, and he had read it and studied it, and we got discussing it. I had learned a lot of geology since then. [Laughter]

Summer Work with the United States Geological Survey

Swent: Actually you didn't work very much in Colorado, did you? I mean subsequently. Were you ever employed by a mining company there?

Boyd: I never really worked, except for the summers, when I worked for the Geological Survey. Thomas S. Lovering was my principal when we filled in the geologic map of Colorado. The International Geologic Congress was going to meet in Colorado in that year, or the following year. We had to finish the map which would be published for that purpose. I was given the job of filling in some gaps. That and the work in the tungsten district.

Swent: That's interesting. This is the United States Geological Survey that was doing the Colorado map?

Boyd: Yes, the USGS.

Swent: Did Colorado also have a state bureau?

Boyed: The principal work done in the mapping of geology was under the control of the United States Geological Survey. They would cooperate with the local state geological association, and they would publish the maps, of course. They had to get the information from lots of sources besides their own staffs.

Swent: Was there any problem of correlating different scales?

Boyd: No, there wasn't.

Swent: Did you work with a standard scale?

Boyd: Well, depended on what we were doing. We had a much bigger scale when we worked in the local districts than we did when we were working with the general geology. The Geological Survey had a series of scale sizes they used for certain kinds of maps.

Swent: Which are standard?

Boyd: They are standard, yes. That's always shown on their map.

Swent: I was asking this question because, when I was talking to Gordon Oakeshott from the California Division of Mines and Geology, one of their problems was taking hundreds of maps of different scales and making a state map.

Boyd: Oh, yes, I would think so.

Swent: And standardizing all those maps. But Colorado evidently didn't have that problem.

Boyd: I suppose they did too. But the production of the maps themselves was always left to the Geological Survey. That's one of the problems the Geological Survey faced. They stuck to scientific geology, and they had to get their appropriations from Congress. Each one had to get a cooperative study going, and there was an awful lot of politics in it, which was unfortunate. It would've been better off if it had left the Geological Survey to go ahead and not to attempt to work by states because politically the states had to show they were getting something done.

Swent: Were you aware of the politics in this when you were working for them that summer?

Boyd: Oh, yes, sure. Where they kept politics out was the Geological Survey. They were very careful about keeping out of politics. But nevertheless, the money had to come from the Congress, and the various members of Congress would be pressing to get more work done in their particular state. So they couldn't go out and just carefully design a program to complete the geological survey of the whole United States. They were forced to go and do some here and some there depending on how they got along with the congressman or the senator in that area.

Swent: How were you aware of this as a young geologist out there doing your work?

Boyd: Well, I wasn't very much aware of it except for the fact that, when I went out to work with the Geological Survey members like Lovering, we knew we had certain things to do. And I was just aware that was a result of having the appropriations coming in there.

Swent: How did you get this job?

Boyd: The Geological Survey had an office in Golden, and there were some great geologists there. Lovering was one of them. Another fellow by the name of Edwin Eckel later became the executive director of the Geological Society of America, and he was that for years. I haven't thought of these people for twenty years. I would work with them, down in the office there, and they would like what they saw. We had meetings with them.

The Golden Philosophical Geological Society

Swent: From the department of the Colorado School of Mines?

Boyd: Yes. Members of the Geological Survey and the Geological Department at Colorado School of Mines, we had social intercourse. I belonged to one thing we called "The Golden Philosophical Geological Society." The ladies would play bridge while we talked geology. So I used to have long discussions with these high-powered geologists who really knew what they were talking about. I got to the point where my mind was stimulated and I would be up all night. We would take new books such as Metamorphic Geology and argue about them. Had a great time.

Swent: How often did you meet?

Boyd: About once a month, except in the summertime when we were all out in the field.

Swent: Were you aware of funding problems for the college?

Boyd: I was aware of them, of course. I knew the fact that the president of the School of Mines had to go and get his money directly from the state legislature. We educated a lot of foreign students, and out-of-state students, and this was costing a lot of money. Engineering education is a more costly function for a state to undertake than the liberal arts.

So that's where the money came from. Except the money that came from oil royalties on state lands, and mining royalties on state lands was assigned to the Colorado School of Mines. Most of it I think. I don't remember exactly how that was in those days. So it automatically came.

After the war, the cost of education went up so dramatically. Except when I was dean for ten or eleven months, I wasn't quite so deeply involved in it. Ben H. Parker did all that. He was the president then. That's when we had to start going after private money.

Boyd: Today, I don't know what proportion of it, but a large proportion of the money that funds the Colorado School of Mines comes from private organizations.

Swent: Which was not true before the war?

Boyd: No, it was a very small amount, coming largely from alumni.

Swent: As a professor, did you do any budgeting?

Boyd: As a professor, no.

Swent: Did you do any administrative functions at the college at all?

Boyd: Well, we had to take part in what was allocated to our department, which, when I came back as a dean, was our big function.

Swent: But as a professor you weren't?

Boyd: No. You knew how many students we had. You know what you can do. You were given a small budget for whatever your needs were. I hate to think what my salary was.

Swent: Wouldn't sound so good now, would it!

Boyd: [Laughs] It's appalling. When you think that I went to Cal Tech at, I told you the figures. And today it costs seven or eight thousand dollars to go there. You can see that the cost of education in terms of number of dollars has increased enormously. Yet I gather that in terms of real dollars the professors are not really paid much more than they were then.

For instance, my son, I don't know what my son's salary is at the University of California, but I wasn't getting paid that amount of money until I was president of a company. So, that's not all inflation.

Swent: No. And yet it sounds as if you were living rather well. You had a full-time housekeeper. Didn't she come with you at this time?

Boyd: Yes, that's right. What we were doing, we were supporting her little daughter as well as our own children. And in return for that she was kind of like Ruth's helper. She cooked and she made beds, and they worked together. We never felt really that she was a maid. She was part of the family. That gave Ruth some help. Then when Hudson, the youngest, was on his feet she left us. She had a college education so she became a paralegal, and she worked for one of the top lawyers in Washington, so she was a pretty smart gal. Then she married somebody in government later on.

Swent: One more question that I had was about this geophysical development. Now you were in on the beginning of a brand new science when you were helping to engineer this equipment for Radiore, and then Radiore went defunct with the Depression. Am I wrong in that? You said that the stock became defunct.

Boyd: Well, I'm trying to think. I never had any more to do with them when I left there.

Swent: The stock was worthless.

Boyd: The stock went to naught. So I don't know that it was active ever again.

Swent: But did other people develop that same equipment?

Boyd: The seismograph was coming into modern use.

Swent: That was developed at Cal Tech, wasn't it? The seismograph?

Boyd: Of course, Cal Tech seismologists have always been some of the very greatest in the world. They have been studying and they are today. All the work they do. They have control of enormous quantities of remote control seismographs that are throughout the state. This was scientific seismology. The development of the seismographs which were used for going out and looking for oil more than for minerals was evolved about the time I was doing work. The result was that what knowledge I had was acquired in Golden.

The B. E. Moritz Instruments Company

Boyd: I was working with an M.I.T. graduate, what do you call them now--a circuit shark. He hadn't graduated from M.I.T., but he'd been there for three or four years. He could sit down with just a piece of paper and work out an electrical circuit. We learned how to make the seismometers that the seismograph companies used. We were just getting into the business of making and selling them when the war came along, and I had to leave.

Swent: When you say "we," you mean as a Colorado School of Mines faculty member?

Boyd: No, no, as a separate company that we had called the B. E. Moritz Instruments Company. Bert Moritz was my partner, and I was kind of the business manager. He was the electronic wizard. He was the son of a druggist in town.

Swent: So you were doing this in addition to your work at the school.

Boyd: Doing that on the side, yes. I'd go by the office. We lived in Denver, you see. We had a house on Downing Street. I'd come back every day after school. Drop into the office and attend to the business affairs. It was more business there. I wasn't contributing much technical knowledge there.

But we had a patent on a medical instrument we called the poly-electro-physiograph. It was a machine that we'd take into the lecture rooms in the hospitals and be able to hear a patient's heartbeat, see the cardiograph on a screen from a patient right in front of all the students.

Also he developed an electric knife. He could change the frequency and harmonics of current and the instrument could cut into the body tissue or just cauterize it depending on how we changed the harmonic structure of the electronic waves. If it was a pure harmonic wave it cut without any cauterization, if it was a jaggedy curve full of harmonics it would coagulate the blood and cauterize it. This was primarily used in the prostate operation where they didn't have to cut everybody open wide. They could do it through a tube.

Swent: And was this widely used then?

Boyd: Oh, yes. General Electric provided the spot gap with all the harmonics on it. We developed one where you could change the number of harmonics on the wave. That was coming along well when the war came along. Bert went off down to Texas and I went in the army.

Swent: And that was the end of your company?

Boyd: That was the end of the company, yes. We had a partly crippled young fellow who had damaged his back when he jumped into a swimming pool one time and hit his head. Well, there were two men in there that did a lot of the work for us. We got into the metallurgical industry and made drying ovens for the machinery houses that were selling laboratory equipment.

Swent: Did you help finance this company?

Boyd: Yes. Well, I went to my friends. Some of the professors out at Mines, but we didn't have a lot of money. My mother- and father-in-law gave some. They lost all that money when we went to war because we hadn't reached the point where we were highly profitable.

V MAJOR BOYD OF THE ARMY AND NAVY MUNITIONS BOARD, 1941-1945

The Commodities Division, Metals and Minerals Section

Swent: We've got you up to the war now.

Boyd: In 1940 the army was asking me to come on duty. I discussed it with Dr. Melvin F. Coolbaugh, the president of the Colorado School of Mines. He felt that my British extraction warranted that decision so he said he would ask the board to approve a leave of absence if the army would hold off until the end of the school year. I was therefore ordered to report to Fort Belvoir in Virginia in June 1941 for refresher training as an engineer officer. I later learned that most of the officers who attended that course were ordered to report to duty in the Philippines. Many of them would have died in the Death March or on Bataan.

When I was all packed, and got all my stuff together, I got a cable from Undersecretary of War Robert Patterson. This guy up here. [Indicates picture on the wall.] He asked me to come into Washington and head up the Metals and Minerals Branch of the Commodities Division of the Army-Navy Munitions Board. I felt that was something I knew more about than soldiering so I agreed to accept.

So instead of going to Ft. Belvoir, I went into Washington to report to the undersecretary of war, through a regular medical major in the army. His name was Harry Morgan. He was head of the Commodities Division, and they made me the head of the Metals and Minerals Section. And I thought I knew something about that.

Fortunately, Morgan had a clear concept of how you train people to work in the government. He'd been around long enough. He wouldn't let me do any actual work until I had studied the mobilization plan which had been developed by the Industrial College in the War Department, and go around and meet the people I'd have to be dealing with. People who were coming in to what was a predecessor of the War Production Board, and people over in the other parts of the army and the navy.

Boyd: About this time we began to see the need of the predecessor of the War Production Board to expand the mineral productions: the copper industry, the lead and zinc industries, and particularly the aluminum industry, and things like that. The Congress had passed one law which permitted, on the approval of the Army-Navy Munitions Board, the War Productions Board, or its predecessor, to issue a certificate of necessity to a company so that they could finance what they were going to do in the way of expansion and get a deduction for the money, the capital, they put out. In other words, to reduce the risk of expansion and make it possible to finance on the market. From a tax standpoint, they could write off the capital expenses faster than they would normally. That encouraged them to raise the money to come in and expand their production.

Then there were other things they could do, such as to borrow money from a Reconstruction Finance Corporation which Mr. Hoover had put into operation before he went out of office.

Swent: How were these companies selected? Did they make an application?

Boyd: They applied to the War Production Board. The name of the top civilian agency changed two or three times early in the war. We'll refer to it as the War Production Board [WPB], not to try to confuse it with a different name. The War Production Board had to get the approval of the Army-Navy Munitions Board to activate this particular instrument which would help people to finance necessary expansion.

Swent: Did you have a committee to advise you on these things?

Boyd: No. But I had many people to talk to in the permanent agencies, such as the Bureau of Mines, which I did by phone. When I took over there was a civilian there who had been receiving these certificates. There was no mechanism in the Army-Navy Munitions Board except him as an individual. So what he had to do was to call up the Bureau of Mines or other agencies to be sure that the company's activities were essential. On behalf of the Munitions Board he would approve them. I didn't know about this until the man got sick. Someone called me up and said, "What about these certificates? Actions are being held up."

I went into his desk, and his drawer was full of unacted-on certificates. He did not know what to do with them. I had a nice, brave, smart young girl, who must have been all of nineteen years of age, as my secretary. She had just been assigned to me. We worked day and night calling up, talking to people, talking to the Geological Survey, the Bureau of Mines, and all the necessary people who would know something about the projects. Then I would approve this activity if I was satisfied with its necessity. When in doubt I conferred with Major Morgan. I don't remember whether the undersecretary had to sign them, but I seem to remember that my

Boyd: signature was authorized, but perhaps it had to have the signature of the undersecretary. I have a feeling that I actually signed it for the Munitions Board, that it went back to the War Production Board, and then they issued the necessary authority. This was my first experience with governmental operations. When the civilian returned to find his drawers empty, he went back home and passed on!

Swent: Was an important part of your job the issuance to mineral production companies of certificates of necessity?

Boyd: No. This instrument was established to certify that an expansion of an activity such as a mine, a smelter, or a mill was essential, and permitted them to accelerate the rate at which amortization could be charged off in tax collections. The WPB alone had the authority to grant such certificates.

Swent: That gave you tremendous power, didn't it?

Boyd: No, not really. It was only one step in the long process of creating a facility required to provide raw materials for the war effort with as little waste in capital as possible. It was the first of a lot of contacts I was delegated to perform for the ANMB with the WPB and it required close working with my navy opposite numbers. It required working with responsible people in the seven supply services: the Ordnance, Quartermaster, Engineers, Signal, Medical, Chemical Warfare and Transportation Corps.

Swent: The War Production Board was a civilian board?

Boyd: Yes. It was the top agency dealing with the problems; it was appointed by the president to administer the supply, set the priorities and allocation of resources. In fact, it was called SPAB before WPB. As the army (the air force was part of the army then) and the navy took over their supply function from the undersecretaries, the WPB was getting organized to set up a high level requirements committee which had representatives from the "claimant agencies" such as the army, represented by General Lucius D. Clay.

Critical Materials

Swent: You came to work for the ANMB, didn't you?

Boyd: Yes; it consisted of Robert P. Patterson for the army and James Forrestal for the navy, and was chaired by Ferdinand Eberstadt. I had not met Patterson until one morning a man walked into my office and gave me a piece of paper signed FDR. He said, "Jim, please do this for me." I quickly jumped to my feet realizing that I had met my boss. I also quickly carried out what the president wanted Bob

Boyd: to do. For the next few months, as steel, copper, and aluminum were critical to the war effort I would be seeing these three, and particularly Eberstadt, quite often. Robert Lovett, then an assistant secretary for air, would be involved with the aluminum problem. Eberstadt asked Bernard Baruch to come down from New York to talk about the way he solved these problems in the First World War.

Aluminum

Boyd: We three spent almost two days together, resulting in the establishment of copper and aluminum interdepartmental committees under my chairmanship, but we needed detailed advice from knowledgeable people in industry so they helped me find such men. "Cap" Aunger from Alcoa and Bob Coe from Bridgeport Brass came down to serve each as staff to the aluminum and copper committees respectively. Cap had an encyclopedic knowledge of all the forms and shapes required to build military equipment, such as airplanes and other commodities. He knew the capacities of the various plants to provide everything from pure aluminum to wire, rod, sheet, extrusions, etc. And if he didn't know himself, he knew where to find out. I had to learn quickly.

One Sunday morning Secretary Patterson called me to a meeting in his office with all of the top staff of the army and air force supply units present. He had a note from the president referring to a message he had from Lord Beaverbrook in London saying that we should be prepard to build 10,000 airplanes a year. He turned to me and asked if we had enough aluminum to accomplish that. I was able immediately to say, "No, sir."

He said, "What do we do about it?"

I was able to say, "We will have to build refineries, rolling mills, forging plants, etc."

Swent: How did Aunger fit into this?

Boyd: Lord Beaverbrook had not spelled out what kind of planes--bombers, fighters, transports, reconnaissance planes, etc. The air force was not prepared to commit themselves at this point. So for the immediate need on planning production facilities Cap sat down alone to estimate the kinds and numbers of planes, and how much of each form of aluminum would be needed. This was the first need supplied. After the war I met him in Pittsburgh and we dug out of his safe the original estimate. He had come within 5 percent of the number of planes actually produced.

Boyd: This was no miracle, but a measure of competence. Every responsible company has to engage in planning its future needs. This was Cap's job at Alcoa and that company was well run. Such help was essential to the war effort.

Swent: How was the Army and Navy Munitions Board staffed?

Boyd: Besides some competent civilians, the board was staffed by army and navy officers such as myself. In this situation many of them were investment bankers, or men experienced in industrial operations. Normally they have to learn a lot about the industries they help to finance. Harry Morgan, Eberstadt, James Forrestal, and Bernard Baruch were examples. I learned a lot from them.

Swent: You said that these two, the copper and aluminum committees, were interdepartmental committees. Who else sat on them?

Boyd: There were many who had to contribute, but most important were the chiefs of the WPB divisions, such as Arthur Bunker of the aluminum division and Harry Green with the copper division, who would have to carry out the actual expansions. Some of these men remained my friends as long as they lived. Barney Baruch, when he would see me in New York, would take me off in a corner to sit for a moment or two to pick my brains. He told me once when we were flying down to Washington that my boss, Lucius Clay, was "the find of the war."

Swent: Were these called the "critical materials?"

Boyd: Yes. Virtually all military supplies except food, but not necessarily clothing, contain one or more of these three metals. Later on I will tell you why we called the allocation of these materials the Controlled Materials Plan.

Swent: When these committees were set up did you know the president of Alcoa?

Boyd: No, but either Mr. Eberstadt or Mr. Baruch introduced us and we conferred only occasionally. It was only during the Korean War when I was Defense Minerals Administrator that I had to deal more intimately with heads of these companies. During this war dealing with them was the job of the WPB. It was the WPB division chiefs who dealt with them direct. It was they who brought new members such as Reynolds and Kaiser into the industry.

Swent: Aluminum was your first concern then?

Boyd: Aluminum was the first concern. WPB had a steel division and they had a pretty good idea what it was all about, but we really didn't have a means of turning the army supply program and the naval program into the requirements for how many rounds of ammunition, how many guns, how many tanks, and how many warships and so forth. We

Boyd: were required to provide the equipment needs to fulfill the war plans that were all worked out in the army, the navy, and the maritime commission. Then we had to turn that requirement into tons of steel, tons of aluminum, pounds of copper, and ounces of gold—all the materials needed.

Swent: And had they already done it for steel?

Boyd: No, they were doing it at the same time. There was not the urgent need for another committee at this level as there was for aluminum and copper.

Copper

Boyd: Then having done the aluminum job, we were turned on to the copper job. They appointed a man from Bridgeport Brass, Robert Coe, who came in, and I worked with him. I was chairman of that committee. We had to get the procurement services geared up to get that information too. The result was the army didn't know how many pounds of brass sheet they needed to make ammunition. They had to get the information on materials from the suppliers, from the brass mills and so forth, how many pounds of sheet of a certain thickness would be required to be punched out to make the million items of supply.

The real problem in the beginning was that the requirements for such materials as aluminum, copper, and steel could be calculated on the basis of the current fiscal year appropriations. By the time the calculations had been made for the needs for these basic commodities in the current appropriations, the Congress had increased the appropriations. The calculations took time and the War Production Board needed to know how much would be needed to beat the Germans and Japanese totally. When the services made the first guesses, the amounts required were far above the production capacity to produce, even when expanded extensively.

There were raucous laughs from WPB, who really did not comprehend the enormity of the problem. The Joint Chiefs of Staff had thoroughly worked out alternative plans but they had to be told what plans could be fitted into expanded availability of basic resources. The first plan, I think, was for ammunition and the resulting demand far exceeded the availability of copper. More cries of disbelief from WPB. But it was now time for them to tell the claimant agencies how much each could expect and to adjust their plans to feasibility.

This is easy to say in two paragraphs, but it involved gigantic effort at all levels from the joint chiefs, their allies in Europe,

Boyd: those responsible for the transport facilities at home, the ship builders, etc. After two or three quarters of a year things began to fall into place.

Swent: When did you come to be working with General Clay?

Boyd: In early 1942 the army was reorganized, as was the navy. General Somervell became commanding general of the Army Supply Force, later to be called the Services of Supply [SOS]. Like most of his officers, he was an engineer officer. General Lucius D. Clay was appointed director of materiel.

He was called to attend a meeting of the WPB and he borrowed me from the undersecretary's office. Because I had been working on the project, he took me along. I seemed to have had the right answers because he never let me go until I left the army in 1946.

Swent: What did he want you to do?

Boyd: He appointed me the chief of the Office of Liaison and Coordination and set me up with an office which I shared with Admiral Williams in the old Munitions Building. We were working for our services with WPB. I had shortly before been promoted to major. Clay's office was also in the building.

Swent: What do you remember about that period?

Boyd: Virtual chaos. The services were calculating their requirements on the basis of their fiscal year appropriations; each month they got additional budgets they would revise their estimates. The real question the WPB needed to know was what did they need to win the war. A fair question, but there had been no time to determine how many soldiers and sailors would be needed and how many rounds of ammunition they might require. For aluminum, Cap Aunger's guesses would not be enough and they were not tied to strategic plans.

Swent: Do you mean to say that there were no strategic plans?

Boyd: By no means. And it is here that the two military departments demonstrated the genius of American organization. It was here that a Colonel Dwight D. Eisenhower came to the cognizance of the material planners. He was well aware of the dependence of military plans on the mobilization of material resources. He was on assignment with G-3, the planning organization of the army, and he asked some of us to discuss it with him.

Swent: You don't mean to say that there were no such plans?

Boyd: Of course not. There were, in the departments, plans for every conceivable contingency. The Army and Navy Munitions Board, through the mobilization plan developed in the Army Industrial College,

Boyd: suggested the way to bring the military and the WPB together. It was this plan that I had to study before I began to operate.

Swent: How did it operate?

Boyd: It required that the military procurement agencies obtain from the contractors bills of materials which they would have to procure from their suppliers in the form and shape they needed, such as steel plate, copper sheet, wire, etc. Then to multiply the separate items by the numbers required for each item. Thus military plans could be tied to availability.

Swent: Was that the whole plan?

Boyd: Heavens no! This was only the part I was immediately concerned with. I had spent two weeks studying the whole plan.

Swent: Did the plan go into effect without problems?

Boyd: Unfortunately, no. The progenitors of WPB had established the Production Requirements Plan whereby they would obtain the requirements for materials from the WPB divisions and the requirements committee staff, supplemented with representatives from the claimant agencies, would divide up the available supply of each material. There was no way for military services, including the maritime commission, to adjust their plans and their procurement agencies contracts.

Swent: How was this problem handled?

Boyd: Well, in May, 1942 the War Department was reorganized and this was what brought General Clay aboard. A meeting was called in Eberstadt's office and a group was set up consisting of a chairman (Robert Lee, an army colonel), myself, and two naval officers, to go over to the War Production Board and see what we could do to change their minds. This was a powerful group who all spoke a different language than we did.

Swent: Was that the end of it?

Boyd: Not quite. We reported back in three days in the same room and the chairman reported our failure. Clay said, "Boyd, what do you think?"

I said that we seemed to be stymied, but we can work something out of it as we were already handling ammunition that way.

"You have sold the army down the river," he said.

My heart fell to my boots, my career was ended. We retired to the next room to write a report.

Boyd: The colonel said, "Jim, you can't sign such a report; you have your orders."

Ferd said that we would not write a report. The "powers that were" went to work at top levels and the principles of the "warrant" plan were adopted by WPB. Lucius never mentioned it again, although I think he still thought that I opposed it.

Swent: Was that the end of it?

Boyd: Now the work began to write and issue the orders to the services to industry and get the flow of paper going properly. With Clay's permission, I used what influence I had to confine this form of allocation to the various forms of iron and steel, copper, and aluminum. I began by calling them the "controlling materials." This would relate the flow of materials to the strategic plan and the WPB divisions could fit numerous other materials into the specific needs governed by the plan, which became named the "Controlled Materials Plan." Clay sent me out to the proper army offices to instruct them on how the plan worked. He called it the "Boyd University."

Swent: This sounds like a simple solution.

Boyd: It turned out to be very effective. What I have just said may sound as if I had a major part. In fact, the responsibility was the WPB's and those charged with it were extraordinary people, highly intelligent and thoughtful. John Fennelly was the chairman of the program adjustment committee on which I was appointed to represent the army, Ferdinand Eberstadt came over from the munitions board to be the program vice chairman to Donald Nelson, the chairman of WPB. They all worked closely with us so my contribution was quite small, if indeed I made any.

Swent: Who were these people?

Boyd: Fennelly was a partner in the financial firm of Glore Forgan in Chicago; he left as soon as things were running smoothly to head up the Committee for Economic Development designed to expedite the conversion of industry to civilian production as soon as the war ended. The man for business and public policy was Karl Schriffgiesser of Prentice-Hall. The major reason for the rapidity that it did happen was Clay's staff. General Bill Draper did much to help this by simplifying the contract termination procedures. Lincoln Gordon took over from Fennelly, although he had been involved right along. He later became our ambassador to Brazil and then president of Johns Hopkins University. The great statistical economist Bertrand Fox, who managed the WPB's statistics, was the only one Clay would trust with the army's detailed statistics. But these were only a few of such people as David Novik, who still consults with the military on such matters.

Swent: This sounds like a very complicated operation.

Boyd: It was by no stretch of the imagination simple. IBM's Holerith punch card machines and electric adding machines were the closest we could come to the modern computers, which did not come without discoveries made long after the war. Even I must have been on the Corps of Engineers punch cards when Bob Patterson needed somebody.

Swent: I didn't realize they existed pre-war, though.

Boyd: Yes. This was the first big step toward the modern computer age. It now seems primitive, but it was a major contribution then.

Swent: Where was your office--before the Pentagon, of course?

Boyd: It was in what is now the secretary of state's office, that corner which is closest to the White House, of that vast building which now covers several blocks. It was built as the New War Department not long before the war. The Corps of Engineers were in there during the war. When Clay took over, I moved with him to the Munitions Building, then to the southwest corner of the Pentagon Building.

My first duty with General Clay involved going to a meeting of the War Production Board, on a subject I had been working on and therefore knew the most about. So I went with him. I had never met the man before. I had the answers. He liked that so much he never let me go again until--he didn't even want to let me go when I left the army to come home, to go back to school.

Pearl Harbor; War Declared

Swent: I see. So that was the beginning. When was that?

Boyd: That would have been after Pearl Harbor. On Pearl Harbor day--the night before Pearl Harbor--an old childhood friend of my wife's and his wife were at our house for dinner. We lived in Maryland. He was a colonel on the Army Construction Board. We didn't have a radio on or anything. After they had left, Mary, the girl who was working with us, came in and said she heard something funny over the radio.

I said, "What was that?"

"They said that the Japanese had attacked Pearl Harbor."

I said, "Mary, don't you know what that means? It means we're at war." And that was the first I heard about it. This was quite late at night.

Swent: This was Sunday night?

Boyd: Sunday night. When I got down to the office in the morning—I didn't have my uniform on. I was the only army officer in town who didn't have my uniform on. I was sent over to the organization which preceded the War Production Board. That was Sidney Hillman from labor and the fellow from General Motors, Bill Knudsen. They were joint chairmen of SPAB, the forerunner of WPB. Also Bill Batt, chairman of SKF Industries, and the chairman of the General Electric Company, Phil Reed. I was the only military officer present. Knudsen and Hillman were replaced by Nelson. The army gave Nelson a three-star general rank so that he could travel around the manufacturing plants and help companies get their jobs done faster.

Swent: But you didn't have your uniform on?

Boyd: I didn't have my uniform on.

Swent: Why not?

Boyd: Because I didn't know I had to have it on. I got down to the office and they sent me over there.

Swent: I see. You had not been working in uniform?

Boyd: Not yet. No, none of us were. We were all civilians at that point. I mean, we all wore civilian clothing. But that night they told everybody in the army they had to get in uniform. I only had my same uniform I had cut down as a--the collars used to be straight up, you know, and they had cut it down and opened the collar into a lapel type. It wasn't a very bright uniform. I had to go and get some made.

Swent: So they sent you over there immediately.

Boyd: I went over there immediately. When Knudsen came in, he said, "Well, gentlemen, you can do today what you couldn't do yesterday." We sat around and talked for five or ten minutes and the meeting was ended. That meant you could close down all civilian production if it was not essential and turn the big plants over to war production, turn them over to making tanks and trucks and things like that. They had all this worked out. They knew what had to be done. At that time they now had gone to war, so no more arguments about whether you should do it or shouldn't do it. You had to do it. So I went back, got into my uniform and then went down to the office. That's very vivid in my mind. That was December 8. We knew about the attack the night of the 7th. I really was pretty naive about things like great movements. I had to grow enormously from there on. On the way down from Maryland to the office, I passed the Japanese embassy and saw the smoke from the burning documents.

Swent: Well, a lot of people weren't experienced. Did they ever call on Hoover for any of his experience as an advisor? Did Roosevelt ever consult with Hoover at all?

Boyd: I really don't know. Truman did, you know. Truman was a great admirer of Hoover. What Mr. Hoover did during these times I don't know. We can find out, you know.

The people I knew at that stage of the game, the names that you know since then, were of course Eberstadt, and Jim Forrestal, and Judge Patterson; he was killed in an airplane accident later on.

Swent: You were really dealing with the top level people all around at that point, weren't you?

Boyd: Yes. One day I was sitting in my office in what is now the State Department Building. This little fellow came into the room and said, "Jim, take care of this for me, would you?"

Suddenly I looked at the note and I looked up, and this was my boss. So I got out of the chair in a hurry. The note said, "Dear Bob, do so and so. Signed, FDR." This was my introduction to how Washington worked. I don't even remember--it wasn't a very major thing, but something the president wanted done, and he gave it to Bob Patterson, and Bob Patterson asked me to do it. I promptly did it. I learned how to do things fast. It was quite a shock for a country school teacher to see how the government worked.

Swent: Well, you were a little more than a country school teacher.

Boyd: I was a country school teacher and don't make any mistake about it. I was naive being suddenly thrust into this thing. Then to realize when I sat down with the undersecretary that day--this was before Clay came onto the scene. They were just beginning to bring in the army and the navy to take on these responsibilities. I was the only one that Patterson knew that he could ask that question about aluminum. How much did I know about aluminum? It was pretty slender, but I had a general idea. I knew approximately how much aluminum we needed and what it should cost.

Swent: You said that Alcoa was the only company, really, but then WPB brought in Kaiser and Reynolds.

Boyd: They were later on produced. They were brought in by the War Production Board, asked to develop their phase of it. But their part in aluminum was small during WWII. Alcoa did almost all of it.

In the Korean War I was the minerals administrator. Actually, I had the responsibility for aluminum and copper and so forth, which was then WPB's job. Truman didn't set up a War Production Board. He wanted to do all of this within the regular departments of the government, so he assigned the responsibility for minerals to the Interior Department, and the obvious place to do that was the Bureau of Mines. I was the director of the Bureau of Mines. Secretary of the Interior Chapman appointed me as the defense minerals

Boyd: administrator. But by this time I had a little more experience. Then I had to deal with Kaiser and Reynolds and Alcoa to expand for the Korean affair.

Magnesium

Swent: Did Kaiser just make ships and jeeps during the Second World War?

Boyd: That's right. He also got into the magnesium business, because I had to send one of the deputies out to see what Kaiser was doing out on the West Coast. He had a different process for making magnesium, and the air force thought they had to have vast quantities for fire bombs. They way over-estimated what they would need. The War Production Board built these large plants. Really Dow could have done it all, with a slight expansion of their facilities. This was one of the few materials producing units which was over-expanded, as I remembered it. But it was still an important factor.

Swent: Somewhere I read that there are ninety strategic minerals?

Boyd: About that, yes.

Swent: But you dealt primarily with aluminum--

Boyd: Well, we dealt with them all, but the big ones. Well, let's go jump ahead a little bit.

Strategic Minerals

Stockpiling and Financing Production

Swent: What is a strategic mineral?

Boyd: Strategic minerals are the minerals that produce the raw materials that you make munitions with, or you need to run your economy in a strategic situation.

Swent: And of course, if you're importing all of them from what becomes your enemy you're in a very delicate situation.

Boyd: That's right. Some of the arguments I got into before the war even started, in early 1941 when I first was there, were discussions of what the stockpiling programs should be. They hadn't really begun to stockpile. If it wasn't for the Reconstruction Finance

Boyd: Corporation that had the money--the fellow who was over there at that time is going to come and stay down here with us next weekend. Simon Strauss. You've heard of Simon?

Swent: Yes.

Boyd: You probably met him.

Swent: I have, yes. He wouldn't remember meeting me, but I have met him.

Boyd: His first wife was a cripple, totally helpless for twenty-five or thirty years. She got polio during the war. He stuck with her. He became a deputy chairman of Asarco before he retired. He still has an office at Asarco. But we've worked very closely together in all these years since then. An early friend of his wife's is his present wife, Janet.

Swent: So the RFC was your source for money?

Boyd: That's right. That's something that Hoover set up in his administration, to find the way to finance industrial entities that were needed by the government. I'm a life member of this organization [indicates a publication].

Swent: The Academy of Political Science.

Boyd: Yes! And I don't read it enough, but I happened to be reading an article the other night because I saw it refers to what we're talking about here. It is a treatise on the political structure needed to raise the funds and to operate in a free enterprise system during an emergency where you have the free trade and self determinate organizations. If decisions are made within this structure, you've got to have some means of providing the funds. You've got to set up a structure whereby people can find those funds, borrow them, or raise them by sale of stock to create the capital to make the plants that produce the goods, whether they be guns or metals from which to build them.

In the army we had a million items of procurement. That's the size of this thing. Clay's assistants were a vice president of the telephone company and a vice president of General Motors. I had to get him to come and sit down with them once a week. I would figure out the way of having a brought-in lunch. These guys would buy the lunch. They were all millionaires. They would buy the lunch every time, but I arranged for who would buy next. They wouldn't let us pay for it because they knew I couldn't afford to pay for it. So there's another collection of people I knew pretty thoroughly, the leaders of these divisions. George Woods, who later became president of World Bank, was the top man in the--well, I'll come back to these people.

Swent: All right.

Boyd: So we're still getting ready to start. The war has been declared.

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Swent: So Donald Nelson was chairman of the WPB, and Eberstadt was--

Boyd: Eberstadt was the vice chairman; John Fennelly, whose book I gave you, was a vice chairman too. There were several people like that.

The Program Adjustment Committee

Working for General Lucius Clay

Swent: But this was a board that was set up by executive order, or by the legislature?

Boyd: The Congress established it. The president appointed it, of course. And he appointed the board. I was an army representative on the program adjustment committee. Clay was the army representative on the requirements committee. If Clay ever had to go to a meeting I hadn't done my job right. John Fennelly was the chairman of the program adjustment committee. Jack Small, a naval commander who later became a commodore, was my naval opposite number. We would sit down at the program adjustment committee, see what requirements the statisticians would bring in, what the production figures were for each of the things we needed, and what requirements had been put in by the military, the maritime commission, the army, the navy, and the civilian agencies: bobby pins for ladies and baby buggies for babies, and railroad trains to move the stuff around.

Swent: And of course by now we were really in the war.

Boyd: We were in the war by now.

Swent: It was extremely urgent, wasn't it?

Boyd: We worked day and night from here on. Then I moved from the new War Department Building over to the Munitions Building, which is across the street on Constitution Avenue. That was built during the First World War, those buildings. The navy was in one end and the army was in the other. In the meantime [General Brehon Burke] Somervell had been made the chief of the service of supply for the army. Clay was his deputy. He was entitled the director of materiel.

Boyd: When he saw me go over to the predecessor of the War Production Board and have the answers for him on that subject--I forget what the subject was now--he liked what he saw and he just glommed onto me and I became the chief of his office of liaison and coordination. As such he appointed me to be the army representative on the program adjustments committee. It was in that committee that we really did all the work. There were representatives of the army, the navy, maritime commission, and the civilian agencies, but the air force was then part of the army. It was rapidly becoming a separate organization.

General Arnold came in and he had two colonels. General Arnold said, "Now you sit behind Boyd and you back him up."

Of course, these fellows, we became fast friends. One became a four-star general and the other one a three-star general.

Swent: What were their names? Do you remember?

Boyd: Bill Irvine was the junior of the two, and Ed Rawlings was the senior. Rawlings, when he left the air force, became the president of General Foods, I think. Bill Irvine, he didn't want to get out of an airplane. He liked to fly. But his wide knowledge was needed. He was the first to fly a B29 bomber from Hawaii to Cairo.

Limitation Order 208 for Gold

Swent: I would like to get into the genesis of War Production Board Order L-208 which closed the gold mines in 1942.

Boyd: Well, my part in that was very small. One day the question came up in the War Production Board because we were releasing people from the army to go into the copper mines. This involved releasing other people. Where do you get these people from to run mines that are producing strategic materials that you needed? How badly did you need gold? It was as simple as that.

Clay asked me one day, "What are the requirements for gold that lead us to go on producing gold if we need those people to produce copper, or lead, or zinc, or something else?" He asked me that question and I couldn't for the life of me think of any reason that--and if we needed any gold we could get it from the treasury. I mean for actual physical use. So I simply had to say that.

Clay then replied to the chairman of the War Production Board, "We have no use for it." That's when they closed the mines down.

Swent: Was there any advocate for gold at the fiscal level?

Boyd: There must have been at the War Production Board, for that board had the sole authority to do it, but I didn't know about it. That's how little I knew about it.

Swent: You were thinking about it only as a--

Boyd: As a material that you needed, and a consumer of manpower. We were dreadfully short of manpower.

Swent: As a matter of fact, very few of those miners ever went to other mines.

Boyd: That's right. We didn't know that. Later on I learned all that, that it didn't do any good anyway.

Swent: That was a devastating decision to the gold mining industry.

Boyd: That's right.

Swent: They never recovered.

Boyd: But don't forget there are thousands of other industries that got devastated too.

Swent: Yes.

Boyd: I can remember members of the War Production Board would talk about how people made advantage out of the war. Well, the American people as a whole--and I mean as a whole--did not. I saw one man one time destroy his own company with a decision like that. He was working on the War Production Board. He had come in from his own company. There was no use for his company and they needed the facilities and so forth. He took the action and destroyed his own company. There were other people who were tougher than that.

Swent: What sort of company was it?

Boyd: It was a manufacturing company. They used a little iron and steel, but it was purely things that were unnecessary. We could get along without them.

Swent: But the workers were still employed in something else?

Boyd: You moved the workers. We were short of workers. Women were coming into the market by the droves, you know. They were in the manufacturing plants and everywhere. Even with them we didn't have enough people. We were putting millions of people in the army, the air force, and the navy.

Swent: I remember, yes.

Boyd: That's as much as I knew about L-208. That's how much I entered into it. I was involved because Clay asked me and I made this advice to him. I would do it again today if it came down to it. You had to be brutal about this.

Other Critical Materials

Nickel

Boyd: In the army I remember when we didn't have enough nickel to make armor plate for the battleships and for the tanks and the guns.

[tape interruption]

Boyd: Nickel as an alloy toughened steel or iron and reduced its brittleness to withstand armor-piercing shells and explosives. But Bethlehem Steel was doing it by specification and not by actual nickel consumption. They made it to the right specification with a lot less nickel than anyone else was making it. So Bethlehem had to give up their secrets to the rest of the industry. What we had to do was work all night. We called people down from the plants to go over all the orders they had for armor plate, get the secrets from Bethlehem, teach them how to do it or tell them how it was done, re-allocate the nickel we had available to do this. We stayed up all night.

I went down to Clay in the morning the next day and said, "Some of these people are feeling the pressure of this thing." He said, "In war, people die for their country."

So you see, you have to set your mind for these kinds of things. The decision whether or not we should protect the gold miners is a matter of total national benefit, even if it doesn't work. You can't always make the right judgment. We overproduced magnesium and we had trouble getting manganese and things like that because we were importing all of that material. Then of course in the meantime we had to be aware of this. There were large organizations that were working on such matters and I had to be aware of them all the time.

I would go in to Clay in the morning. I thought you stood at attention with the general, but I sat down in his overstuffed chair and cocked my leg over the arm and told him what I had to do that day. Sometimes he wouldn't even answer. He never forgot anything, but I would detect when he approved. He would ask a question here and there, and then I would go about and do what needed to be done either by phone or at the Program Adjustment Committee. He had that much confidence in me.

Wrought Iron Chain

Boyd: One time I went over to the War Production Board and the navy came in with a requirement for wrought iron chain, for anchors and things like that. They hadn't said anything to me about it. I knew that amount was way beyond the capacity of the industry to produce. I checked it out with my people down in the Ordnance Department and somewhere else, and I said, "No. I can't approve it."

I knew I was in for trouble. Jack Small had to go back to the Munitions Building where the navy's headquarters were, and I had to go across to the Pentagon Building by this time. I went right to the general's office, and sure enough the general was on the telephone with Admiral Robinson. "Your man Boyd was arguing with the navy before the civilian agencies."

"I'll check into it, Admiral."

He turned around to me and said, "What happened?" I told him.

"Get me the admiral back." He didn't say another word to me. He said, "You know, Admiral," just as sweet as he could be, "if Small will talk about these things before he goes to a meeting with Boyd, he won't have this kind of trouble."

The next week I got invited for lunch down to the flag officer's dining room in the Munitions Building. The nearest junior officer to me was a three-star admiral. We never had any trouble like that again. Jack and I would exchange information.

Then I had this man [indicating photo on wall] from Jesse Jones's organization as my assistant.

Swent: What was his name?

Boyd: His name was Milton Backlund. He was my assistant and he would do all the checking around with the various agencies to see if we were in accord—fortunately my memory in those days was pretty good. Since we worked long hours we would get into some discussions. I'm quite sure I went to sleep in some of those meetings. But whenever something came up I woke up. I was always ready with the answers when I woke up.

Then we had a wonderful man, a lieutenant colonel by the name of Maurice Scharff. He was an electrical engineer. He was in the production division under these powerful people from the banking profession in the production division. He always sat behind me and he always carried a big briefcase full of figures. He eventually went to Germany with me as my deputy there. Of course, we were

Boyd: intimate friends. He always had the right figures for me or knew how to get them. I don't want to confuse you more, but I'm going in as far as I can remember.

Swent: I think we're getting into some important things here, how things were really done.

Boyd: Well, there's one case in that book of Fennelly's I gave you which is not as clear in there as I remember it. I think he mentions what the subject was. I'll give you two examples of what happens here. [Fennelly, John, Memoirs of a Bureaucrat, October House, Chicago 1965.]

Brass Sheet

Boyd: First was in this particular case--brass sheet. They had an international agency with the British. There was a combined copper committee. It was conflicting with the War Production Board in a way. The British wanted to know how much of this brass sheet they could get. Don Nelson was confused by all this. So he wrote a letter to the chairman of the Joint Chiefs of Staff, Admiral Leahy, asking John's advice. The army's people sent it to General Clay, so he sent it to me to write the answer with John Fennelly. He suggested that the copper be distributed between the countries on the basis of each country's capacity to consume it.

I sat down with John and we wrote this letter. He showed it to Nelson and Nelson said, "I could think of all the ways you ought to do it." And he signed it. Then it went across to the Combined Chiefs of Staff. That brought the British into the answer.

When I got back out of the office they have to know something about brass sheet. Well, that would be me. So I was put on the committee of the Combined Chiefs of Staff, which included the British. We came up with a solution in that committee and we wrote it up. It went back up the channel through Admiral Leahy and back up to the chairman of the War Production Board, in the way I have related it above, and he called John. John took it in to Nelson.

Swent: Right back where it started.

Boyd: Right where it started from. Pretty soon people began to realize this, and I did this all by telephone. McChesney Martin, has that name ever come to you?

Swent: No, not yet.

Boyd: He came in to be the head of the Federal Reserve Board later. McChesney Martin, "Bill" Martin. Anyway, I was called over to the

Boyd: Joint Chiefs of Staff early one day to discuss one of these subjects. By this time I was major, or a lieutenant colonel. I've forgotten which. Fred Eberstadt called me over to the office to meet this Lieutenant Martin. My dignity was badly hurt, but I hadn't been with him ten minutes before I knew why he was where he was. He was a staff member of the Joint Chiefs of Staff, and he was a brilliant man. It was a joy to be with him, and what do you care about rank from that aspect?

Steel Plate

Boyd: Another time we came to the steel plate. Jerry Land was the admiral who was the head of the maritime commission having to build ships. They had a demand for so much steel plate. He began to pound the table. Clay and I went over to the War Production Board and Jerry was pounding the table, and Clay wouldn't budge an inch. I wrote him a little note and I said, "I've got fifty thousand tons of plate that we could let him have."

He wouldn't give him a word. So we got in the car. I frequently drove him over to these meetings. He said, "You could go and tell the admiral that we could give him fifty thousand tons." But he wasn't going to be bullied. [laughs] Pounding the table didn't do any good.

How did I know that? I don't remember how I knew that. Of course, we had to talk with the ordnance people and the quartermaster and so forth to find out how much steel they had and find out how much their contracts required, also what and how much of any item their contracts did not need immediately, and what their allocations were.

Developing the Controlling Materials Plan

Boyd: Before this happened, when we were still in the Munitions Building--no, we were still where the State Department is now--Eberstadt called a meeting of the Munitions Board. This was in Clay's early days. He picked me up when he was getting into the job. There was another colonel with me, and there was a civilian. They appointed a committee of us, a naval officer and myself and two civilians out of the secretary's office. We went over and for three days we sat down with the War Production Board to see how we could make the Productions Requirement Plan [PRP] work. This was a scheme the War Production Board had come up with.

Boyd: The army and navy had developed before the war the plan that I had read. The military had designed a commodities mobilization plan, CMP. Thereby you could assign so many tons of steel plate to the Ordnance Department, for example, and then to contractors, who then had the authority to place that much steel plate orders [out the maker?]. It acted like currency. You could buy with this currency so many tons of plate from this one steel mill and from another. So you could really tie this into a program, coming out of the military plans.

Swent: You mean you issued sort of a scrip?

Boyd: Well, it was essentially what it would amount to. We made an allocation of so many tons of steel to each of the agencies who were doing the ordering of material to supply a strategic plan. We had to divide it all up. We got the estimated amount of that material to be produced for the coming quarter from the War Production Board. Some went to the army, some was to the navy, etc. Then that was spread out through their contracting agencies and given to the manufacturer in the form of an allotment or a note which they would place on the steel mill to get it delivered. That's the way we tied in the programs to the availability of material, and hence to the military plan. This seemed like a very complicated business. Allocation would be made quarterly. By the second quarter it was working quite well and it was possible to make more adjustments as difficulties arose.

I even coined words which became part of the language.

Swent: Such as?

Boyd: Well, let's see if I can think of one. Oh, because it took time to get that paper down through the system and then get out and be placed on the mills, there were some orders that never got through. So you ended up finding that some order did not show up at the mill, or there were smaller amounts than what you had really said you would need. I called that a migrating peak. That became part of the language. It just came off my head in the middle of a meeting sometime and we got stuck with it.

There's another one that came out of my mind, too, I'm pretty sure. But this gets lost. A lot of people think that probably they coined it. The CMP, the Critical Materials Mobilization Plan. It was called the Materials Mobilization Plan. There's a hundred materials you're talking about. You remember you said there are a hundred critical materials?

Swent: Yes.

Boyd: You couldn't have a mass of paper involved in doing that, so to control your programs, you had to control the critical material, which is steel, copper, and aluminum. If you made allocations of those you could control your programs. You could convert that--

Swent: Coal was not?

Boyd: No, coal, fuel, and energy was something different, they were not handled by CMP, nor needed to be.

Swent: What happened to the production requirements plan?

Boyd: That was basically what the WPB was doing, commodity branch by branch. In other words, you establish your program, and you can make a program by allocating so much steel and so much aluminum and so much copper. The other commodities could be filled in by the WPB. When we had that battle, I was sent over there to discuss what they were going to do, which was sit down in their infinite wisdom and divide up without any issue of paper like that; the War Production Board would decide how much copper would go to the army and how much copper would go to the navy, how much copper to the maritime commission, and so forth, just by seeing the orders that came in through the plant. There was no way to tie it in the strategy needs. This CMP filled in.

For three solid days I sat down and listened to all this. I turned to our chairman who came out of the textile business, a big man. I said, "Bob, am I stupid? I don't seem to understand these words."

He said, "Jim, these people have been sitting together for the New Deal, and words mean something different to them than to the rest of us. So you have to learn a new language." This happened all the time. I helped develop it, I guess, by coining words.

After that meeting, the major said, "Jim, you've got your orders. You can't agree to that."

So Ferd picked it up and he said he would handle it. How he handled it I don't know, but when I went home that night I felt it was the end of Jim Boyd as far as Lucius Clay was concerned.

Swent: You thought he was angry?

Boyd: He <u>was</u> angry, because they had worked and set the whole business on setting up the controlled materials plan, and I had dubbed it the controlling materials plan. Rather than try to have a plan that would actually do, through all this motion, all ninety materials, you would do it over the critical materials. That controlled the program, and then the War Production Board could fit in what would be allocated. We wouldn't have to bother. The contractors would

Boyd: need platinum or canvas duck or something like that, would be fit into the program. But we would control the programs through the critical materials.

Then Clay sent me out to teach the various procurement districts how to do this thing. He called it the Boyd University Plan. So he forgave me, I guess.

Supplying a Nation at War

General Clay

[Date of Interview: October 31, 1986] ##

Boyd: This is about the time that General Clay came into the materials picture in the army. Remember, I had come to work for the undersecretary of war in the Army-Navy Munitions Board. Then, when they re-organized the army and the navy to handle the supply questions--this was after Pearl Harbor--the army set up the materials division. General Clay was the director of materials for the army under Somervell, who was the chief of supply. It happens that the engineers were given the job of provision of materials and supply. The doughboys became the fighting soldiers. That was one of General Clay's concerns. He had gone to West Point, he had been trained as a soldier, and here he was back in Washington sitting behind a desk. It didn't please him very well.

Swent: So the chain of command was Somervell, Clay, Boyd?

Boyd: Yes.

Swent: And was there a similar arrangement in the navy?

Boyd: Yes. That was Admiral Robinson. The maritime commission, that was Admiral Land. I'll tell you some stories about him in a while. Admiral Vickery was his second in command. I went and watched him launch a ship one time. The third in line opposite me in the maritime commission was a man who had come out from one of the big corporations. His boss came into the maritime commission and supply, and he came with him. He was doing for the maritime commission what I was doing for the army. His name was Thomas Berlage. We lived together for a while because my family hadn't arrived yet and he had an apartment downtown on Sixteenth Street, so until my family came I lived in this apartment with him so I could work with him.

Conditions in Washington

Swent: You haven't said very much about conditions in Washington at that time. Is there anything that you would like to mention about that, how you went about finding a house, and so on.

Boyd: When I was ordered to duty in the army I didn't know whether I would be there for a month or go off to fight, or what it would be. So I looked around for a place to rent. I found a place out in Maryland just over the border from Washington, D.C. at the end of Massachusetts Avenue. I rented that house, but I stayed with Berlage until the family was ready to move from Denver.

Swent: Now your family consisted of how many children?

Boyd: My wife, a young lady that worked for us and her child, and my two eldest sons. My two youngest sons were born in Washington after we had been there a while.

There were a lot of people moving out of Washington, D.C. When we moved into the Pentagon Building a little later, I was looking for a house closer to the Pentagon Building. We gave up that house we were renting in Maryland and we had a house down in Arlington, Virginia, for the rest of the time we were there. By that time the two younger ones were born. But it was time for Brown and Bruce to begin to go to school, and they went to school in Arlington, Virginia.

We had a brand new car before we left Denver. We could see what was coming on, and it was getting hard to find a car. We had two cars, as a matter of fact. I had to commute out to Golden and out in the field, and Ruth had to have a car in town. But we gave up those two and a friend of ours who ran a Chrysler agency sold us a Chrysler which we brought back to Washington with us for the war. And it was quite a while after the war before we could get another one.

Aluminum Production

Swent: Could we go back now to your plan for controlling aluminum; how effective was it?

Boyd: When the war was over, I was in Pittsburgh and Cap Aunger had gone back to Alcoa. I looked him up, and I said, "Cap, have you got those reports that you wrote?" And he said, yes, he had them in a safe, because they were all top secret. We got them out and we actually produced in the war to within 5 percent of the number of

Boyd: planes he had used, and the mix of planes. Now that shows the greatness of that mind. Here he was stuck back in a room. He had no public appearance at all. He went back to Alcoa as a statistician. But Alcoa couldn't do without him, and we couldn't do without him, and that's how that came about. Unger wasn't even paid. He did this as a member of this committee, on loan by Alcoa. I wouldn't know the details. We just had to be careful that we didn't let any of the politicians know, but there was no place else to get the information. Nobody else produced aluminum; remember that it was a relatively new metal in 1941.

Swent: The air force already had some planes of aluminum?

Boyd: Yes, so they did have contracts out for building airplanes. But we were still building some fabric planes. The air force procurement people weren't stupid; they'd been fighting with this problem for some time, a relatively new one.

Building a Staff

Swent: How did you build your staff?

Boyd: My boss was a major, later on a full colonel [Morgan], in the medical corps, and he was in charge of the commodities division. He was the one that sent me out to study the mobilization plan which had been written by the Army Industrial College in peacetime. He wouldn't let me do anything, when I came aboard, until I'd read that thing through from beginning to end. A civilian was my assistant, and as a matter of fact he ran it while I was learning. I ran around and met all the people in the Bureau of Mines and the Geological Survey and the War Production Board—the civilian agencies.

This fellow got sick one day, and he went off, and I got into his desk. His desk was full to the top. So I had a nineteen-year-old young lady who was my secretary and she was a gem. I had five different letterheads, I had five different hats on, and she would know which letterhead to use. I'd work on these things all day and I even had to drive her home at night because I didn't want her on the streets at night. For the army, I signed my name on these certificates of necessity, and that gave the WPB assurance that the facility involved was contributing to the war effort. WPB would, if it agreed, issue authority to the company to proceed. When it came time for taxes, they could take more depreciation of equipment than you would normally--called accelerated depreciation.

Swent: Was there any recourse if a company wanted to appeal your decision?

Boyd: No, the decision was WPB's, not mine. I'll show you this later on, when we get into the structure of Clay's office.

So first of all, the Munitions Board, in cooperation with the WPB, set up an aluminum committee. And while that was going on, we set up a copper committee. And I got someone from the copper industry to come and do the same thing that Cap Unger was doing for aluminum.

Swent: There were more companies involved there?

Boyd: Yes, and that made it all the more ticklish. I don't remember quite how we did that, but WPB had the primary responsibility so that it was clear, yet everybody who needed to had a voice in it. WPB would go to all the companies who would give them a figure and then put the plans together. There had to be staff to deal with this, and I didn't have much staff. A man named Robert Coe was there to help me do this. I signed that report too, and out of that came the expansion of the plants that we needed. For instance, you read in John Fennelly's book the story about how the combined resources board were up against a problem because the effort needed brass strip for making ammunitions in England, and here too, and how we could divide it up. He tells how we did it. It got signed by the chairman of the combined chiefs of staff, was transmitted to the chairman of the War Production Board, but actually John and I did the whole thing. But it must be remembered that between us we had access to requirement and capacity figures. When it came over to Defense, he wrote the letter that officially came over Nelson's signature, and when the Joint Chiefs of Staff set it up, who did they put on the committee but me? Nobody else [laughs]. I had some othe people on the committee, so we prepared the reply, wrote the answer, and when Nelson saw it, he hadn't the faintest idea what had gone on. John gave it to him, and he thought John had done the whole thing. John and I had written the letters together to be sure the desired result was clear, even though it was signed by the chairman of the Joint Chiefs of Staff.

So it worked, because how could an army general, or an admiral, know anything about this kind of stuff? They had to bring in people lik us to provide the background thinking for solving the problem.

Getting Things Done

Swent: Fennelly mentioned in his book that he thought the professors "showed greater understanding than businessmen...of governmental machinery, and greater flexibility in adapting themselves to red tape." He must have been speaking about you.

Boyd: I'm sure I wasn't the only professor he dealt with, but working together, he was a businessman. He was a partner in one of the big financial houses in Chicago, Glore Forgan.

Swent: So the people came from finance, academics, and business?

Boyd: They came from the armed forces, the professions, and all walks of life.

Swent: It's interesting that you and Fennelly both seem to feel that the businessmen were not as adept.

Boyd: You see, a businessman has to set up procedures, and stay within these procedures. When you're working in the government, you have so many angles coming in from all directions, you have to be flexible enough to take these things into consideration. But I hadn't thought about it that way. But what they liked about me in the WPB, and this has been mentioned in many places, is that if they wanted anything done in the army, they'd call me up, and I seemed to know where to go. I knew that if you wanted to get anything done in the army, or for that matter in the civilian agencies, you had to know who had authority and who had the knowledge, and where you'd get the information. Because if you got crossed up with the red tape, it was just hopeless. You can't just go to anybody, you've got to go to the right place. In most cases red tape is established to guide people to the right source. If you did not stay in channels you could get bogged down in red tape.

And because of that training that Colonel Morgan gave me, I knew where to go. So someone would call me up and say, "We can't get this done, so and so in the ordnance department--" or any other department to talk to a responsible person. Well, I'd ask, "What about this?"

Some of them made it very clear that they didn't want all these memoranda going back and forth--what's the telephone for? So I'd call up and arrange for this to be done, or get this information out, and maybe in a matter of hours or minutes, I was able to get them to the right place and get the right information. I suppose that's where that came from.

Swent: You give Morgan the credit for this.

Boyd: He was the one that made me see who did what, what the mobilization plan was, and how it worked. Few people get into government that have that kind of training. That carried me forward when I went to Germany. I sent men who had been chief executive officers of large companies off to school--much to their annoyance, but most of them expressed their appreciation later.

Swent: This has been one of your top skills all your life, hasn't it, this ability to get things done?

Boyd: I suppose from there on, it has. I didn't have it before--oh, I guess I had--I was a crew chief in the field when I was less than a year out of college. So it must have been inbred.

Swent: Not something you were taught in a course in college.

Boyd: Well, when you think that I was taught at Cal Tech--you have to ask this question--I started out to be an electrical engineer, and then my friends were civil engineers, so I changed to civil engineering. At the end of my sophomore year, you had to make up your mind what you were going to be.

I had a friend who was a mechanical engineer, he was going to design airplanes, and fly them, and so on. So I decided what I needed to do was to study economics. I had a feeling that one day, my ambition was to be president of a copper company.

We had a very fine Englishman who was head of the economics department, Professor Laing. I would suspect that it was that training, concurrent with engineering, that trained my mind to get to the right sources.

More About General Clay

Boyd: When I got to Germany, by this time I was a full colonel, but the eagles [insignia of a colonel] had no authority at all; you had to have a star on your shoulder to get anything done. I went to Clay, and I said, "In order to get this job done, I'm going to need a general. So why don't you get me a general, and I'll be his executive officer, and we can run it that way."

"Who do you want?"

I mentioned this man's name. "He's no good." Now, you see, any one of these generals, these men who grew up in the army or the navy, they kept a little black book, either in their mind or in their pocket, and every man they ever worked with they kept track of, and once they had gained confidence in a man, they would seek to have him assigned to them. That's why I went to Germany. That's why Clay went in with Somervell, because they had been together. Marshall came that way up to get to be the chief of staff over many fine men. In other words, these men had demonstrated their abilities, and they were in somebody's mind when put in places of authority. So as a result they were able to build up the competence

Boyd: of the army and the navy structure so quickly after 1941. This is where I was working, in that atmosphere, so you couldn't get much better training than that.

Clay taught me how to be an executive.

Chief of the Office of Liaison and Coordination

Swent: Maybe this is the time to tell us more about General Clay.

Boyd: I came as close to hero-worshipping Clay as any man I've ever known. Without him, I wouldn't have been half the man I was; he was my real strength. We'll see later on; we hadn't gotten to him yet.

In the early days, he made me the chief of an office of liaison and coordination. It was my job to be liaison with the War Production Board and to coordinate with the Quartermaster Corps, the Medical Corps, the Signal Corps, the Transporation Corps, the Corps of Engineers, and the Chemical Warfare Service--seven of them. They all had responsibility for training the men and designing the equipment, doing the research, and it had to be coordinated. So they were doing the actual procurement and they had direct contact with the divisions of WPB. We did not concern ourselves with day-to-day operations and came into the picture when problems arose.

Procurement

Boyd: General Walter Wood, whose job was coordinating the services activities and building up the army supply program, came in one day to see Clay, and he said, "I'll be damned if I'll have ladies' brassieres in my army supply program." Clay looked at him and said, "We have WACS, don't we?"

There were a million items. One day I had to deal with lumber, or canvas duck, or textiles, or the next day with steel. I would go in to see the general in the morning, knowing what my agenda was for the day, and sit down on the overstuffed chair and kick my leg over the arm, and I'd start to tell him. And I knew immediately when he understood. Then he would maybe ask a question or two; sometimes he wouldn't say anything. Then I would go about my busy day and do these things. He never forgot what I had said to him.

Helping England to Get Coal

Boyd: One day the Board of Economic Warfare called me up and said, "We've got a real problem. Ships are going down so we can't provide enough coal to England. We do not have the staff to handle procurement of large engineering equipment to mine low-grade coal available in England, and how are we going to procure it?" He said, "The army will have to do it."

I said, "Well, you'll have to ask us." So we sat down and wrote a letter to General Clay, and asked the army to do this job. So I said to Clay, "You know our problem with coal." He said yes, he understood the problem. I said, "Do you want to accept?" and he said, "I suppose we will have to," so he read a letter, the letter I wrote for him and gave to him to sign. He said, "All right, smarty, you go do it."

Well, where do I go? This was mining equipment, great big walking shovels and drag lines that they were using for the levees on the rivers, things like that. So I called up an acquaintance, the colonel in charge of procurement in the Corps of Engineers, and we talked it over and he accepted the job and they hunted up all the equipment and so in a few weeks we wrote out a report of what the machines were, and what they would produce and so forth, and I showed it to Clay. "Okay, go ahead." I thought, "The son of a gun hasn't even read it." After all the work I'd done.

Well, about six months later, one day the colonel called up and said, "You know, Jim, machine number 2 is supposed to leave from Newport News and the ship that is supposed to pick it up is down in New Orleans. Will you get the Transporation Corps and switch some trains around?" Here it takes two trains to move that machine; it was enormous.

So the Transporation Corps arranged the boat and the trains, so they got this all moving, we knew what the tonnage was. Fortunately, we had a very great man who became a great friend of mine later on who ran one of the coal equipment manufacturing companies, Joy Manufacturing Company. He was over in England and he knew enough about this that he worked it out. But anyway, I wrote the report, and Clay said, "This is not what you told me six months ago." I said, "No, sir, I made some changes." He said, "That's all right." But he remembered every blessed machine. And these machines, one machine might have two trainloads of equipment, and the corps had to get all the spare parts for them, they had to get them produced, and had to pack them and send them off to England. That made it possible for the English to solve some of their shipping problems.

Boyd: My job was really quite small; it was my job to keep track. Every night we had a report on how many ships were sunk, how many ships were going on line and coming off the ways (built), so we knew what our total shipping was, and I had to have it available so that Clay could make decisions involving such matters. This was a routine thing that had to be in my mind all the time. By this time I was Clay's executive officer, not just dealing with raw materials.

Swent: You were doing a tremendous job.

Boyd: Of course, there was no lack of interest. But you know, my children were with me. By this time I had four, and Douglas and Hudson were small. They were born in Washington. They weren't up when I left in the morning, and they'd gone to bed when I got home at night. And after a while, Milt [Backlund] and I would go out on Sunday and take the afternoon off to cut wood so I got some exercise.

Swent: You were really working seven days a week, then.

Boyd: Oh, yes. Then gradually we got Sundays off. And sometimes I would be there all night. It's a good thing I was in good physical shape. Clay wasn't a lot older than I, about ten years older.

Swent: Was there a point at which you could see that the war was going to be over, and you had the procurement work about done?

Boyd: Long before that, at meetings of the program adjustment committee, we had settled the allocations to be made, with some argument. But what happened, while we were doing this, we knew what was coming up. Milt Backlund by this time had come aboard, and he would go around to all the agencies and check with them. He made friends very easily. He could go and work with the right man, at the Corps of Engineers for example, and be sure the figures were right, and we could live with that kind of thing. Then I'd be ready to trade, to balance this thing out. That's why John Fennelly liked us so much because he didn't have to sit there and be a god, and decide between the army and the navy and the air force and the civilian agencies and the maritime commission; we had worked it out in advance; we'd traded.

On the War Production Board, involved with the distribution of materials, we had the association of great people. There was one, Bertrand Fox, the general would show anything to. He was the only one on the War Production Board he would trust with requirement figures that might reveal secrets. Bert and I are still friends. We could talk freely about numbers.

Anticipating the End of the War

Boyd: John Fennelly had left the WPB to organize the Committee for Economic Development--this was a private organization that had committees all over the country determining the plant capacities in each locality which could quickly convert back to civilian production so when the war ended, they would quickly turn to domestic production, to try to meet all the demand for automobiles and beds and baby buggies and hairpins and all the myriad needs of society. A fellow named Lincoln Gordon took Fennelly's place. Link later was Ambassador to Brazil, he was also president of Johns Hopkins University. But things were now calmer.

Promotion to General Clay's Executive Officer

Boyd: And I said to Clay, "Look, my job's done. Isn't there something more useful I can do?" Well, what he did was to send his executive officer, an ordnance colonel and an old friend, and he got him promoted to brigadier general, and sent him back to ordnance, and he took me to his direct office. I had had an office upstairs, with Backlund. And now I became his executive officer.

Remember that these seven divisions, under Clay, had very powerful men in them.

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Now I gave up the membership on the program adjustment committee and my liaison job to WPB. Now, the people in charge of the production division were people like Frank Denton, from the Mellon Bank in Pittsburgh, and George Woods, his assistant, who was the top man in the First of Boston Corporation. After the war I tried to get him to come to Germany with me, he went on to become president of the World Bank. They couldn't understand how I could be so close to Clay. Obviously, many times they would call me and I would listen. Particularly George Woods was very smart about that. He'd say, "Now, we've got this and we've got that; what do you think the general will say about it?" And I'd say, "I think the general would say this." "Be seein' you," and off he'd go and do it.

I always reported these things to Clay, because we knew each other so thoroughly that I could speak for him. And never once did I have to go back and change it. That association was so great. But this put me in the position that I went to the War Production Board, not as a member from the production division. They felt they

Boyd: ought to be there, and they wanted me out of there. They wanted me to take over the conservation division of Clay's staff. But later, when Clay went to Europe, Mr. Bruce kept me on.

They'd never believe that I didn't have some sort of pull. But when I came to Washington, I didn't know a soul in town but the main photographer, George Harris of Harris and Ewing—you've heard of them, haven't you?

Swent: Yes, I have.

Boyd: He was a great friend of Ruth's father, and they were the only people we knew in Washington. I'd never met anybody in the army. Later on one of my classmates came in, but he was with another division. So anything that occurred to me wasn't because I knew anybody before, but because I was able to demonstrate some sort of understanding, and be able to get things done. I guess, I don't know. There was some resentment about it, but they all remained my friends, so I guess it wasn't a very serious one.

Then when things began to straighten out in Europe, we had a terrible time getting Cherbourg straightened around. The flow of stuff wasn't coming into Cherbourg, and it was needed to back up the army going into Germany, and so forth. So they sent for Clay to straighten out Cherbourg, and the supply lines from the coast to the battle line.

That meant that Mr. Howard Bruce came in. He was chairman of the board of the First National Bank of Baltimore. He took Clay's place. So I stayed on as Bruce's executive officer, and we became very close friends, of course. I'll show you later on how close it was. My relationship with Howard was almost as good as it was with Clay. He was a civilian, but in the organization, we didn't really care, as most of us were really civilians. I don't suppose more than five percent of the officers on Clay's staff were regular army. They were reserve officers, as I was, or they were assimilated officers, given a commission. For instance, Milt [Backlund] came to Clay--have I told you how he came to the rank of major?

Swent: No, I don't believe so.

Boyd: Clay called me in one day and he said, "You've got an assistant." I'd been needing an assistant. So he gave me this piece of paper, showed me this man's history. He'd been a director or trustee of one of the universities in Houston, and president of Jesse Jones's insurance companies. I said to Clay, "What do you want another professor around here for?"

He said, "If he's good enough for Jesse Jones, he's good enough for me." Well, with great reluctance, I took Milt on and he was just superb. He had no children, and he had a lovely Southern wife

Boyd: whom we call every birthday even now. He would be out working all day long, getting this information, checking things. He was really the mechanism that made me so acceptable. I'm quite sure it was. And so he stayed on with Bruce too.

General Clay had been back in Washington. After Cherbourg was straightened out, much to his disgust he was brought back to Washington to be Jim Byrnes's assistant. Jim Byrnes was in the White House, he'd been on the Supreme Court, and he was doing much to rehabilitate the economy. Before this, before he went to Cherbourg, Clay had seen the end of the war coming.

While we were worrying about V-J Day or V-E Day or so forth, and I would go in worrying about them, I made some remark, and he said, "Jim, we can't do anything to help Eisenhower or MacArthur now. If we hadn't done it four years ago, we can't do anything now."

So he was here planning reconversion. And General Draper, this fellow [indicates photograph on wall], he, with an admiral who got into trouble over atomic energy--they planned the reconversion period. They saw that they had to have contract cancellations and negotiations so that the companies could immediately get converted and obtain loans, called VE loans, to provide them money to reconvert their plants to civilian production.

And then out in the field was John Fennelly with the Committee for Economic Development (CED), (which was founded by some of the great business leaders of the era, such as Paul Hoffman and Marion B. Folsom) in each of the major cities around, seeing what that city could do [to stimulate] domestic production. There were more than 2000 local communities. They could see what was needed, automobiles and beds and all the things you need, building materials and so on.

A Crisis in Ammunition Supplies

Swent: And this all started well before the end of the war.

Boyd: Near the end of the war, when Eisenhower began to move through Europe, they began to run out of ammunition. The planners had underestimated the rate of fire that divisions would need. We were shooting off ammunition much faster than was estimated, so we were really running out. And we got to the Battle of the Bulge, if you remember. General Tony McAuliffe, in charge of that unit in the Battle of the Bulge, had been in the requirements division in Clay's office before General Wood. And he went off and got command of the unit involved in that battle.

Boyd: So Somervell called me in and said, "You go up to New York and sit down with the boys in Wall Street." And Harry Morgan, knowing everybody in Wall Street, arranged for me to meet the most influential. "And then you go down to New Orleans, where Bill Green of A F of L is having his convention, and convince them that we need more ammunition. And then go up to Pittsburgh and see Phil Murray, the head of the steelworkers."

So I got in the airplane and I flew down there. But all I had were the "eyes-only" telegrams from Eisenhower to Marshall. I went to see Bill Green, president of the AFL. I got down there early in the morning. I knew where Bill Green was. I got in touch with his secretary and told her who I was, and she said, "The president would like you to have breakfast with him."

So I went up and we sat down and I showed him these telegrams, and I said, if you will do what you can, we're really serious about going back to making ammunition. "Okay."

So I climbed on the airplane and went up to Pittsburgh. There again, I got there early in the morning, to Phil Murray's office, and he hadn't gotten back from Washington yet because he had gone home by train. I hadn't been out of uniform yet. So Phil came in and we talked a while. He put his feet up on the table; he was a very nice guy. I showed him these cables, and he said he'd do what he could.

Then I took the plane from Pittsburgh and went up to New York and talked to Harry Morgan. He introduced me to the powers that be on Wall Street. I showed them the cables I had. By this time the weather had closed in so I had to take the train back to Washington. Harry was coming down too, so through his influence, we got ourselves a drawing room.

So we climbed on the train, and found the drawing room, all the porters were around, "Yes, Mr. Louis"--it was Joe Louis, the fighter, and they had put him down in Harry's drawing room, but they had to get him out and find him another seat so we could get in. I'm just as glad he didn't want to fight that day [laughs]. He was a sergeant in the army, and here I was a colonel [laughs]. So anyway, we had our trip back to Washington.

Swent: Did you have to get extra financing for this?

Boyd: No, we had seen the end of the war, we hadn't realized how in order to get there, we were using ammunition faster than our plans had laid out. And this Battle of the Bulge had given us food for thought, so we had to get ammunition started being produced again. As it turned out, it didn't do any good, because none of that got over there before the war was over, unless some of it went to the Pacific.

Swent: You had stopped shipping ammunition to Europe?

Boyd: Well, it had slowed down. You see, there was an enormous pipeline from production plant, through inspection lines, the railroad trains to get to the ships, to be piled up to go on a ship to be taken across. People don't realize there is an awful long pipeline of material from the production to the gun that shoots it off.

Swent: I think it's interesting that you went to the union people rather than to the corporation people.

Boyd: We went to both. I happened to go to see the union people first, because that was the way it was set up. Anyway, I was sitting in airplanes all night long, and I was ready to go to bed when I got home. Besides that, the WPB was in touch with the business executives.

Swent: The contracts to be revamped were with industries. To reestablish the production lines, contracts had to be extended, did they not?

Boyd: Yes. I went to Wall Street because those on Wall Street, including Harry Morgan, were close enough to the leaders, on boards and so forth, that without showing those cables to too many people, they could convey the urgency and be trusted with it. That was the reason for doing it that way.

Swent: So General Clay was back in Washington in another capacity.

Boyd: He'd been in Cherbourg, he got that straightened out, and they brought him back to work on reconversion with Judge Byrnes, who had left the Supreme Court to help in the White House.

Then I was sitting one day in the Pentagon building waiting for General Draper. He came in and said, "Roosevelt is dead." Much as I disliked the man—I never saw him—I was just as shocked as if I'd lost a close friend.

By this time, Clay had gone to Europe. He'd been appointed to be the deputy military governor under Eisenhower. He had asked for me before he went over there, and Howard Bruce (his successor) had said to me, "The general will want you to go over there." Well, it hadn't occurred to me that he would. So I went home and said to Ruth, "Howard said that Lucius will want me over in Germany."

She didn't hesitate a minute. She said, "It's a very important job, and if he needs you, you're going to have to go." The very next day, he [Draper] called me down to a little office he had in the Pentagon, and he said, "Jim, will you go to Germany?" and I said, "Yes, sir." He said, "I'll have to ask Howard Bruce." I answered that it will be all right with him, I think.

Boyd: So he talked to Howard that afternoon, and the next morning he called me up again, and he said, "Didn't you understand what I said yesterday?" and I said, "Yes, sir, didn't you understand what I said?"

He said, "I don't know what kind of job you'll have, but I assure you it will tax your abilities."

He went over there, and within ten days he sent for me. So I had to pack Ruth up. Milt took charge and he solved the transportation and getting the things packed up. Ruthie put the five children and the maid in the car and put it on the train to go down to Williamsburg so the boys could see Williamsburg before they trekked west to Denver.

In the meantime, we had rented our house in Denver to some people in the restaurant business who were afraid of being out on the West Coast, too close to Japan. By this time, they saw that was over, so they had gone back to the coast, so our house was empty, so Ruthie could go back there.

VI COLONEL BOYD IN GERMANY, 1945-1946

Boyd: So General Clay wanted me right away. It took four or five days for me to get packed up. Howard Bruce had already approved my transfer. And I got on a plane, and—

Swent: What kind of plane was it?

Boyd: It was a four-engine propeller-driven plane. [AC54] They could cross the Atlantic in one or two jumps. They had to go to Newfoundland and gas up. We had to go across the coast of France, and we got shot at. We could see the shells bursting below us. But they weren't anywhere near us. Eisenhower had bypassed those ports; he didn't waste energy taking them. There were German troops left behind, but they weren't doing any harm.

We landed at Orly field, and the plane had to go between shell holes on the runway. The plane had bucket seats; it was a very uncomfortable trip. I arrived at St. Cloud. A colonel friend of mine sent a car to pick me up and I stayed in a beautiful chalet at St. Cloud. The office was in Versailles. That's where the SHAEF [Supreme Headquarters, Allied Expeditionary Force] headquarters were.

I had to check in. Clay by this time was up at Rheims, and I said, "Here I am; what do I do?" He said, "Come up here." So I said to my colonel friend, "How am I getting up?" He said, "You'll take my car and my driver will take you up."

General Clay's Deputy in Charge of German Industry

Boyd: I went in to see Clay, and I said, "Here I am, what will I do?" and he said, "You're in charge of German industry." I said, "What will I do?" and he said, "That's your problem, Colonel."

ABOVE: General Lucius Clay decorating Colonel James Boyd. Legion of Merit with oak leaf cluster.

LEFT: Colonel James Boyd at work

Boyd: I said, "Well, do I report to you?" and he said, "No, I haven't got any authority. I haven't been appointed yet. You're going to work for Bob Crawford, who's G-4." G-4 was the supply side of SHAEF.

So I went and reported to General Crawford, and he had me set up as a special branch chief in SHAEF headquarters. And I said, "What's the policy?" and he said, "That's your problem, Colonel."

But you'll read in there somewhere in these books that we were ruled by something called JCS 1067 [Joint Chiefs of Staff order number 1067], which was put together by Secretary Henry Morgenthau, who was secretary of the treasury and Jewish. He was all for really subjugating Germany. We called it the "pasteralization of Germany." The military government people had taken this and worked out what they had to do.

Then someone handed me JCS 1067, and when I read this, I said, now I've got to have some help. I didn't even know how to read this stuff. So I asked for Colonel Don McLean, a great lawyer, who later became a lawyer for the Rockefeller brothers in New York. And Clay said, "You can't have him; I need him."

I said, "Well, you told me you don't have a job yet, so can't I have him until you get your job?" He allowed that was so, so Don came over to Rheims, and I would work all day getting staff together and a place to work and dealing with New York about sending me people and this, that, and the other. And he would read JCS 1067, finding out what the policy was, and he'd come and sit on my bed at night and give me the night treatment.

I finally got room in the hotel, the Lion d'Or, where Ike [General Eisenhower] used to come for his meals, if he wasn't staying in some chalet or other. It was there I worked until I could get an office set up in Frankfurt. At that point we hadn't crossed the Rhine yet. This was about April of 1945.

I didn't have any help, any staff. I did have Don to help me.

Swent: And of course you couldn't get information from Germany.

Boyd: That's right. Then they brought me a British brigadier, a man who became a great friend. This was SHAEF forward, you see, and there was a mixture of British and American officers. This was my opposite number, and I was the senior officer although he was a brigadier and I was a colonel. But we didn't have any problem with that.

Have you seen this new picture on television of George Patton? Well, George was now down in Bavaria, setting himself up as King of Bavaria, and he wasn't paying any attention to what Ike wanted at all. And what Clay wanted was to re-establish the monetary system

Boyd: so that trade could go on naturally. This was why he [Patton] was relieved of his 8th Army command and put in charge of a history unit. It was while on this job that he was killed.

The German Surrender; General Eisenhower

Boyd: While I was in Rheims, the surrender came. The only office that became available to me was the office of a British general officer who was home on leave. And it was right underneath the war room. One of the colonels came to me and said, "Well, this is it," when these two German officers went by and went upstairs to the war room to surrender.

But Ike wouldn't have anything to do with them. He'd been up to Buchenwald and I saw him when he came back from Buchenwald. If I'd had a nail and put it between his teeth, I'm sure he would have bitten it in half. I never saw a man so angry. It was a brutal thing to see. And he wouldn't deal with them. So poor "Beadle" Smith [General Walter Bedell Smith] had to deal with them.

Ike would stay down in his office and Beadle would come back and ask him questions. So that meant the war was essentially over, in Europe. It wasn't long after that that I began to find out I wasn't easy to work with because I didn't have enough rank, so I talked to Clay about it. Not that I wanted to be a general, but I had to get the job done. But he wouldn't let me have the one [aide] I suggested. Maybe it was a good thing.

General George Patton

Boyd: So Georgie Patton was acting up. He was beginning to trade across the border with Czechoslovakia, not trade, but barter. So I was sent down there to remonstrate with him. And I get down there. In Georgie's zone you had to put on your polished helmet liner, and you had to have your boots polished. We never wore boots at all. One of my friends in ordnance gave me a Belgian shoulder holster, that was all the artillery I carried.

So I had to get dolled up and go to see General Patton. I arrived there and the G-4 met me; his name was General Maude Mueller. He was quite a character. He had a beautiful string orchestra go with him for every meal. By this time, they had conquered Bavaria. He loved music, and he told me a story about how you SOBs up there are telling us we've got to feed the German

Boyd: soldiers down here. And you've got to feed yourself off the land. He said, "There's no food down here. We're not going to stay down here and see these guys die of hunger. They'll get army rations."

Well, I talked to him about what we were supposed to do. He went over to see the general, and he had nothing like the picture [the movie, "Patton"]. He had an office as long as this house, I guess. I had to walk the full length of his office to talk to him. Anyway, I remonstrated with him, and said we ought to do this thing properly. At this point I had moved to Berlin and was established in the undamaged half of a demolished house.

It was Friday night and I had to be back in Berlin Saturday because Clay expected all the division commanders to be there on Saturday morning. He apologized and sent me with his L-5 plane to go down to a Bavarian airport. The youngster pilot put his wingtip down on the runway and spun it around, stopped the plane that was all ready to take off, and put me aboard [laughs]. There was no signal system; if there was fog you flew blind up to Tempelhof in Berlin. One time I had to go up in Beadle Smith's plane and sometimes there was a regular plane going up there.

Problems with the Press ##

Boyd: Anyway, we were getting a lot of political pressure. The newspaper reporters were reporting that we were using the Nazis, and all this kind of stuff.

Swent: American newspapers, back home?

Boyd: Yes. Then there was one newspaper article that came to my attention, and--let me get the story straight--he was telling what we had done in Nuremberg, that we were putting German industry back before we got industry started in the United States. I said, "Have you been down to Nuremberg?" He said, "No," and I said, "You'd better get down there with me, hadn't you? There's hardly a stick moving, or rocks standing on each other. The only building that's left in Nuremberg is the building where we're holding the trials." And so he did go on and see it, and later on, he apologized.

Anyway, when I got back from Bavaria, a reporter came in to see Brigadier Ronnie Winton and me (we were British and Americans in charge of the industrial side of the military) and we told the reporter what we were doing and so forth, and then after we had finished talking, we were standing looking out the window, and I mentioned this problem of not feeding the German soldiers in Bavaria. And never thought anything more about it.

Boyd: The next day the PRO [public relations officer] called me up and said, "Have you seen this thing going back to New York?"

I said, "No."

He said, "Well, you'd better get down there."

So I flew down to Paris, hunted this reporter up at the Scribe Hotel, and I said, "Is there any way you can stop this?"

He said, "It's gone back to New York."

I said, "Can't you stop it somewhere? It isn't true, we've got a hard enough time getting this thing going; this story is going to make it very tough."

So then I went over to see the ambassador. He was chairman of the board of one of the big insurance companies--Lewis Douglas. I'd met Lew before, and I told him what I wanted to do. He was very worried about all this kind of thing. This reporter said he would do what he could; he'd send a cable back.

General Clay's Understanding

Boyd: So I went right back to Rheims. I went to see Clay, and I said, "Look, this is what's happened."

He said, "Can you do anything more about it?"

I said, "No, sir."

He said, "Well, go back to work. Forget it."

Well, somehow it never appeared. You asked me how I felt about Clay. That's the kind of man he was. These are examples. We understood each other, we never fought, we never gainsaid each other. Somehow or other we were able to come to the same conclusions. The only time that I had a problem was before Clay really got started, when the munitions board was still active.

Organizing a Staff

Swent: Did you see a lot of him in Germany, or were you working more on your own?

Boyd: Well, when I got there first, to Rheims, Don and I had to work on our own. In the meantime, we had people back in Washington doing staff work. They sent me the president of the Republic Steel Company to take care of steel, in my organization. The vice president of General Motors Company, to be my executive. The vice president of Westinghouse Electric Company, to take care of the electrical system. The man who I'd already worked with was in the army, a colonel, would be in charge of the energy systems, the power plants and things like that. Walker Cisler. I'd worked with him in Washington. He had a colonel's rank. But when he came to Germany to do this, he had to report to me. So there again, there was a close association. He'd be in Paris today and Berlin tomorrow; anytime I needed him he was right there. He had a house in Berlin.

Moving to Germany

Swent: Where was your office?

Boyd: I started in Frankfurt, and as soon as we cleared out Berlin, I moved up to Berlin. It was still smoking when I went there the first time. We went in to the chancellery where Hitler's body was burned. It was hardly cold when we got in there. The Russians of course were already there, and they ransacked everything. And raped the women. They didn't leave any for us.

Swent: Was Frankfurt in better condition than Berlin?

Boyd: No. In order to get into Frankfurt, there were some buildings there--there was one building that was quite narrow, but deep--the bombs had come down and skipped through the building and exploded out in the yard. The corps of engineers were able to repair it, and they did it so quickly that people thought it hadn't been bombed at all. We had to have a bulldozer go ahead of us to get through the streets.

I was there that close to it. The house that they gave me to live in was a duplex, and the other side of the duplex was totally gone. The attic of my apartment was a place where a firebomb had come through and it sputtered out on the tile floor of the attic. I guess it was full of stuff, but the people had cleaned it up for me so there was nothing but a bed and a few chairs for me to stay.

Then what I had to do was find a place in Berlin. They assigned me a little house near the Dahlemdorf station, right across the street. They assigned me a tank sergeant, to be my chauffeur. He had gotten trench feet commanding in France and they had put him off to a more sedentary job, so he was my driver and my batman and everything else. He ran my little household for me. And I put him

Boyd: upstairs in the house, but I kept the lady who owned the house. I kept her on and moved her up to the third floor, and we took the best part of the house. She was delighted. She didn't speak a word of English, and I had to learn Deutsch in order to get my [boiled eggs, in German] for breakfast.

Swent: She cooked for you?

Boyd: She cooked for us. And when I left later on, the tears streamed out of her eyes. It was her home and she kept it up the way it was, and we didn't make any mess of it.

Swent: And in exchange, she got fed, of course.

Boyd: She got fed. I don't know that we ever exchanged anything; there was somebody else handling all that.

Implementing Joint Chiefs of Staff Order 1067

Boyd: Well, we got wandering off. Let's get back to JCS 1067. This was the document that was supposed to arrange everything. You've read somewhere--it's in a book that Clemmie's reading--what great people we were dealing with, and Clay's relationship to them.

What we had to do was take that document, and get the Joint Chiefs of Staff to change their plans. Clay would get on the teletype. When he was dealing with my field, I'd go in with him to the teletype, and we'd correspond with the State Department over the teletype. We didn't have a radio or anything like that. We had to type it out, and get the reply on the teletype.

Value of Scientific and Engineering Training

Boyd: You asked whether or not what I have been engaged in in my life has any relationship to the training I received in the years as an undergraduate student and in graduate school at the Colorado School of Mines. We had always, in working with students, had to try and get them to understand that you don't learn much in school, that you are training your mind so that it can absorb and understand what they're doing. Because by the time you get out of school, the things you have learned in the way of facts, of the subjects which you are studying, became obsolete. So if you are training your mind to think in an engineering or a scientific manner, then when you come and face the realities of life, you've got to adjust your thinking to handle these situations.

Boyd: So it is really the training of the method of thinking, whether it is scientific or engineering, and there's a difference between the scientific mind and the engineering mind. I was trained as a scientist, and secondarily as an economist. Almost everything I had to do involved economics and/or engineering and science.

Swent: So it was the ways of thinking that--

Boyd: Made me much better able to handle the changes in situations. I can remember particularly when I was in the army and I was given a new job to do, things changed, as I will show you at one point. I always bucked the change; I didn't want to change; I didn't see how I could possibly have the knowledge or the ability to handle a job I'd never heard of before. [chuckles] But you had to go in there, and you had to do it. Because you couldn't say no; if the boss says you're going to do this, you go and do it.

We got this plan over; Clay never said another thing about it. I never had any trouble with him about it, because that was my order and I didn't do anything to gainsay it. So we got the War Production Board then to adopt this plan, and we called it the materials requirement plan, where they were going to do all the allocation from some committee in Washington. This way you had demands through a statistical system, approved by the requirements committee, you pass the money back (or the money in terms of steel and copper and so forth) to the agencies, and they could give it to their contractors who would cash them in.

It was I that had thought up the idea that you didn't need to do this to all materials; that you could do the rest of it by allocation from the War Production Board, the vanadium and the chromium and tungsten and things like that. The cotton duck and wood and things like that. You could, through the production requirements plan, have the departments of the War Production Board authorize people to consume the materials.

So I said really this is a controlling materials plan. Really, they ended up by calling it the Controlled Materials Plan. So I suppose I coined that word.

Swent: So it really was your plan that they used?

Boyd: No. The plan was called "The Warrant Plan" in the mobilization plan. I had only a slight influence on the final name.

Swent: This whole part of your career, it seems to me, you were doing things that had never been done before by anybody.

Boyd: Well, I could wish that I was that important. There were a lot of very fine people working on this. I was just a little cog in the

Boyd: wheel. We had Barney Baruch come down from New York; he had done in the First World War what Don Nelson was doing in the second.

Swent: So he was your link to the past.

Boyd: Having spent several days with him, and later on at other periods, and being associated with the people who knew him very well and followed him, he gave us great advice about how he went about doing it in the First World War.

Swent: Still there must have been vast differences.

Boyd: Oh, there were. But in the meantime, the Army Industrial College had kept those studies going which resulted in the warrant plan that I've told you about which the WPB turned into the Controlled Materials Plan. That was the plan that we worked with, so I had been apprised and studied that before I ever sat down to do any work in the army. My academic training would have trained my mind to work with a problem like that even though I'd never heard of it before.

Then when I began to handle the aluminum situation, and the boss said, "You're the chairman of an interdepartmental committee that's got to get aluminum going," I'd never heard the names of the forms that were made in order to put aluminum to use. Rolling it into sheet, drawing it into tube or bar, casting it into castings, forging it with big hammers; why you did all this, I'd never taken any courses in metallurgy, but it didn't take me long to understand what it was. Although I never went out and worked with these things, I became fairly expert; I could understand what was going on, and why these things were needed.

Swent: Your need to know this was only so you could have a reasonable expectation of how long it took?

Boyd: That's right. For instance, when I told you that we had the aluminum committee, we found out how many airplanes we needed to produce, and then we went to the people who knew how many tons of this or that would be required to build an airplane.

Swent: And you had to know whether what they were saying was reasonable or not.

Boyd: That's right, and that was why I would be useful sitting in at a meeting where people didn't have that kind of training, so my mind would be able to fathom those questions. I suppose that's what you mean by whether or not you use your training. The important thing is to train your mind to think. I often said to my students in college, "If I train you to have one thought from this course, I will be successful as your professor."

Boyd: At Cal Tech, we had the honor system; we could take our books in with us and the problems were given to us. We weren't supposed to remember all the formulae and things like that, but how to solve this particular problem in this particular subject. And that trains your mind, to think that way. You get a little impatient with people who go wandering all over the place, and sometimes I've got a reputation of being a little impatient [chuckles].

General Clay, An Engineer

Swent: Were you more patient than General Clay, or less?

Boyd: I suppose we were about the same. The more I've thought this, since you raised the question about my association with Clay--we thought alike. I wasn't as smart as he was, by any means, but we had the same mental approach. We could communicate without structuring sentences and things like that; a few words, we'd understand each other, and we didn't have to waste a lot of time talking about it. Quickly, I could go in and I'd say, well, these are the facts, the situation, and what we'd do about it, and he might have a suggestion. He was trained as an engineer too, and that is what the West Pointers are, engineers. Particularly those who were high in their classes.

General Somervell, Another Engineer

Swent: Did he have a similar relationship with his superiors? Do you know?

Boyd: With Somervell? I expect so. Somervell was an engineer too, you know. Clay and Somervell got along--well, they were two strong minds, and there would be some conflict, but it didn't interfere.

For instance, Somervell went on a trip to Africa and he saw that they took the wooden boxes that the food came in and used them for firewood, and he thought that was wonderful, so he thought we ought to put all our quartermaster's supplies in wooden boxes. So Clay had the quartermaster bring some boxes made of wood that had been tossed off the side of a ship, and showed him what the result was, and had one that was in multi-leafed cartons, and thrown off a factory wall, and that had survived. Somervell had issued the order to use wood. Clay asked him to see the sample in his office. I was there when he came up there. And Somervell had the integrity, the knowledge, to be able to say, "Well, we'll change the order," and did so back to cardboard. Firewood was supplied in better ways.

Boyd: I took a colonel, a civilian who was in the international division, where we had to prepare for having the medical supplies available when the armies went in to take care of the people. As they liberated areas, we had to be prepared to do that. And they had a whole division at work on it. And General Somervell went to a lend-lease meeting, and what he agreed with the British to do, we simply couldn't do. I can't remember details of it now, and I didn't know it then, but this colonel did. Clay was traveling around the world somewhere, so I took the colonel down to see Somervell. And this colonel explained what had gone wrong with this procedure.

I thought, well, he's telling this great man that he was wrong. But Somervell didn't say that, it didn't worry him. He said, "All right, Colonel, what do I do that's right?" And the colonel told him what would be right, and he said, "Well, go do it." Now that's the kind of mental atmosphere in which I worked. And that trained me as an executive. You don't go telling people. It used to annoy me, when I got into industry, to have people come in to me and say, what do you want me to do on this thing, and I'd say, "Not what I want you to do; you've got this job; what is it in your job that's the right thing for our company to do? You tell me; then we can decide what to do."

Swent: To get information to flow up is very difficult sometimes.

Boyd: That's part of being an executive. Although people accused General Clay of being a Caesar type. He was pretty firm in his opinions, but nevertheless, when someone pointed out that he was wrong, it was no trouble for him to change and say do it the right way. But he was pretty firm when he was sure of himself, and he was more sure of himself than most people I knew, because he knew more. His mind was terribly retentive. I've told you about the reports I gave him.

Swent: When you got into Germany, this was something that had not been done before. You didn't have any guidelines for that, did you?

Boyd: Well, [laughs], the only guideline we had was JCS 1067.

Swent: This was contradictory. JCS 1067 wanted to keep Germany an agrarian nation, and yet you were bringing in the head of US Steel and these great people to develop industry.

Boyd: The only trouble I had there was keeping these industrialists on my staff from running German industry. Now our job was to get the Germans to run their industry, not come and do it for them.

Swent: But essentially, isn't there a contradiction here, that you were developing industry at all, when the policy was not to?

Boyd: No, I don't think so, because remember we were still fighting with Japan, and our country had been badly upset by the fact that we were concentrated on the war economy; it would have to be turned over. The Germans would have to take care of themselves; otherwise we would be in a bind forever. And our job--and Clay was very clear about this--and we had to battle sometimes with the State Department to get the concept across that we don't go in there and run this thing for them, that they've got to do it themselves.

What we had to do was get the Nazi mentality out of the picture.

Swent: But there was no sense that there should be no German industry?

Boyd: This brings up one thing that we haven't talked about. While we were there, a California oil man, Ed Pauley, went to Moscow and worked out a deal with the Russians on reparations. And when he came back from Moscow, he sat down with General Draper, this gentleman up behind me [indicating photo on wall], and one or two others, and we were just horrified at what he had agreed to do. That we were going to get a level of industry which Germany would be allowed to develop which would be no greater than the lowest level of all the countries that they had around them, that they'd attacked. We could never get the Russians to give us what their level of industry was, how many ounces of food they ate a year, in calories, or how many pairs of shoes, and how many things like that. What was the allowance to be given? So we had to do it on our own, but we did know more about the French, and we knew more about the Belgians, and so forth. But we weren't to allow Germany to build an industry which would go beyond that level. That was the level of industry. And it was the level of industry committee which I sat on in Berlin, among others.

The Level of Industry Committee

Establishing Requirements

[Date of Interview: November 1, 1986] ##

Boyd: We had the head of economics department at Duke University. This was General Draper's economist, or at least he was working with him for General Clay. Now what we did was to take him, put him in a room by himself and have a telephone there which nobody was allowed to call in. He could call out and get information. It was his job to draw up a plan for the level of industry which would produce what should be, so many pairs of shoes, so many calories of food, so many suits of clothes, so many handkerchiefs; all the things that need to

Boyd: be done to support the minimum of economy. Then we could go to the level of industry committee including the French, the Russians, the British, and ourselves and decide what that determination would be and recommend it to the Allied Control Council. That would end up by being so many tons of steel, so many tons of coal, or fertilizer, and all those kinds of things.

So he did this almost all by himself. He had the power to come to us to ask questions, but we weren't allowed to go in to him. He kept alone to think this thing through. The council adopted it pretty well the way he wrote it. As a matter of fact, I had a bet with General Clay one night that when this all came out and agreed that there would be so many tons of steel capacity left in Germany, seventy-five thousand tons, or whatever it was. It couldn't have been very much. The U.S. produced then about a hundred million tons per annum.

Anyway, I put on my little slip of paper the figure that this man had come up with. When we opened these things up after the meetings had been held and agreed, I was right on the nose. I won the money.

These names will be in my diaries, upstairs in my logs. I'll probably run across them there. But it's coming out and I haven't thought about it for forty years. [I haven't found them yet--7/21/87]

Swent: You started with how many finished things you would need and then you translated that back into raw materials?

Boyd: Into raw materials and so forth. Then we had to have Germany earning its own foreign currency, so they could buy things they didn't have. Our job was to re-establish Germany on a much lower level than it had been but not so they could dominate the people around. It was there that Patton was wanting to trade with Czechoslovakia. Well, not trade, but to barter this for that. He wasn't setting up an economic system where we would have money coming across the border. That's one reason that he was--I don't ever remember him getting deeply involved in the denazification program. One day I got on a train, on Goering's train in Berlin, with General Oliver Echols, who was Clay's deputy. He was an air force general. We took a train ride down to Frankfurt. We stopped there and I went in to see Lucius [Clay] in his office. He handed me a piece of paper and said, "This denazification order. What do you think about it?"

This said essentially that you will not put in places of responsibility people who were Nazis. Before I got down to Stuttgart he had issued this order. The field offices really came down on me. Who was going to run these plants? Are they going to get so they become self sufficient? We can't have anyone who

Boyd: belonged to the Nazi party, [but] they had [all] been forced to belong. So it wasn't Patton alone. If he said that, that picture [the movie, Patton] seems to indicate that that was his great sin that he opposed the denazification, that he played with Nazis. I just don't believe that. I don't think he did that. I don't know where they got that story from.

He may have had the same problem that I had in getting the German industry going, and being Georgie Patton, he would say it more emphatically than I. But we had to go and do it, that's all. It was the rule of the land. How would we face the public back here if we rebuild the Nazi structure? It was quite obvious that politically and otherwise we had to put that order out, and Clay was right in doing it. But it made things pretty tough.

Swent: So you did have to check the people that you were working with?

Boyd: Absolutely, yes. We had intelligence groups, and the Germans always kept records of everything they ever did, even how many Jews they killed. They were meticulous in keeping their records.

Swent: You mentioned Stuttgart. What sort of condition was Stuttgart in?

Boyd: Stuttgart was pretty well leveled, you see. Stuttgart was the center of the ball bearing industry, so we made a tremendous raid and a lot of people were killed bombing Stuttgart. When we got in there everybody was amazed to find out that the Germans had long since moved the ball bearing industry out of Stuttgart and had it up in the hills. We did hardly any damage to their ball bearing plants at all. Then the economic minister in Bavaria was named Erhard when I was there. He later became chancellor. He followed Adenauer. He called me on the phone one time and he spoke English fairly well. He said he wanted permission to open ball bearing plants in Bavaria.

I said, well, the trouble is that we've got an international agreement and the French are very firm about allowing you to make ball bearings because they say this is "tres dangereux." We hadn't gotten that agreement in the council.

Swent: Did the French manufacture ball bearings? Did they have any industry of their own that they were protecting?

Boyd: I expect so, yes. After all, they had been punished pretty badly by the Germans, and they didn't want to see the German thing rise the way it has risen again.

Swent: Were you able to use the remnants of the ball bearing industry then in Stuttgart, the ones that were around on the hills? Were they functioning so that you could use them?

Boyd: Yes.

Rebuilding Coal Mines

Swent: And the mines?

Boyd: Well, we had to rebuild the mines as quickly as possible. When the coal mines--you've heard of Bob Koenig?

Swent: Yes.

Boyd: Well, Bob Koenig was in the army and he came up through France into Germany, and his job was to keep the coal mines going. It would allow industry and the people to support themselves. I don't know if I've told you this story, but one time they put a unit into one of these mines, kept the pumps running so that the mine would not fill with water. The Germans had come back, but the Americans had fought them off. Finally they got chased away. Eisenhower came down to decorate this unit for their bravery in maintaining this operation. There was a young lieutenant there. Ike walked down in front. He said, "What do you do, Lieutenant?"

"I work for the Eisenhower Coal Corporation, sir," [he said].

Ike walked a few steps, came back and he said, "Are we making any money?"

Swent: [laughs]

Boyd: That was Koenig. The first time I met him was in Rheims. He had a little office in there with a desk and a chair for him and one for me to sit on. I said, "How much coal are you going to have next year?"

He reached to the bottom of his desk and he brought back a couple of towels with a feather duster stuck in it. He put it on his head and he got a couple of round glass paper weights, put them up, and he started looking in the crystal ball. That was my introduction to Bob. We became good friends after that.

Then the assistant secretary for war was Jack McCloy. We had a meeting in Berlin and I was there. I had to be there with him on Saturday mornings. Whatever I was doing, I had to be back in Berlin for our morning meeting with Clay. McCloy said that he had a report from another man that I knew later on who was president of a coal company. He had come in and seen how much coal they were going to produce and he made a report.

McCloy said, "Well, he's got a report saying this much coal will be produced."

Boyd: I said, "You didn't ask me for that report. That came from outside. We haven't got the food, we haven't got the steel, [nor] do we have the manpower. We can't redevelop that coal to that level in that period of time. No matter what you think. You have to have coal to make steel, you have to have steel to mine coal, and you've got to have the people fed." We would give the miners food so they could put in a day's work and what do they do but take their lunch buckets in and take their food home to their children. So this was the kind of thing you faced when you were trying to solve these problems.

Swent: Where did you begin?

Boyd: Well, the problems descend on you all day long, and you have to come to conclusions and get people to help with them and things like that. Then of course, all these high-powered people they sent me to do it—I think I listed them for you, didn't I?

Swent: Yes, you did, or some of them at least. So each one, I suppose, wanted to start with his own area?

Boyd: Well, that's right, but they had to follow the instructions, of course. They weren't supposed to go and run it themselves. They had to try and find the people to do it and see whether they had the raw materials they would need and so on.

Then when they came, did I tell you that I sent them off to school?

Swent: No, that you had not mentioned.

Boyd: When they first arrived they were told they were going to work for General Clay. When they got there they found that this country school teacher was the boss. They were working for me. That hurt their pride a bit. Furthermore, where they came from they had buttons to press and people to do things. I didn't have any buttons for them to press, or secretaries for them. They had to go out and work on their own. So in my wisdom, I sent them off to school because I hadn't been apprised, I didn't know what a Land Kreis was, or Stadt Kreis, the political structure of the German society. I didn't know who ruled what. The military government people were there. We could get help from them. But that all had to be learned. You couldn't operate in a society which is so different from ours without understanding how the society worked.

Swent: So these people had been hired in Washington, not by you, by somebody else?

Boyd: We had a man, a very prominent industrialist who sat in the Pentagon Building. They would send me people that they thought we would need. These were people such as Jack Weiser, who was president of Republic Steel Company. Jack came in to run the steel end. I'm

Boyd: sure it hurt Jack's pride to know that he was going to report to a wee small colonel, a country school teacher. But we soon got over that. We became good friends. Then a vice president of Westinghouse. Fortunately I had a vice president of General Motors who had run the General Motors plant in Germany before the war, out of Wiesbaden. He even had a house there. Pete Hoagland, who later became the vice president of all General Motors operations. He came in as my deputy, and I left him down in the American Zone, and he had his office in Frankfurt. When we moved up from Rheims he had his office in Frankfurt. Then I had Maurice Scharff, a colonel, who was an electrical engineer. He came out of the production division of Clay's office, because we had become very friendly and I asked for him. He came in and was my deputy in Berlin. He lived in the house I lived in in Berlin. And Pete Hoagland lived in my house in Frankfurt. I would commute back and forth and these people would run those different offices. Hoagland was rebuilding German industry and Scharff was helping me work with the Russians and the French and the British and do what we had to do.

Swent: Now the country was divided into zones.

Boyd: Four zones.

International Committee Structure

Swent: But you were not confined only to the American zone?

Boyd: Well, we had to deal with each other, so we had international committees. I was on the industrial committee, the level of industry committee, and the reparations committee. There were Russians, French, British, and Americans. We rotated the chairmanship. This month I would be chairman, and the next month the Russian would be chairman, next month the British, and the next month French. The Russians were pretty good committee operators. They knew how to do it. They didn't take any nonsense.

Translators and Interpreters

Boyd: Of course, we had to do this by translation, but most of them understood a lot more English than they would take credit for. The French would never speak English even though they spoke it perfectly. They would never carry on the business in English. So you had to have an interpreter there. My interpreter was a Pole. The Nazis had hit him on the head and cracked his skull. He escaped out of Poland through Switzerland, had gone to school at Princeton.

Boyd: His English was immaculate. His German was fluent, and his Russian was perfect. A very bright young fellow. I've got a book he's written since then. And he became a professor in a college in upstate New York.

He would go in there. After we had the meeting these interpreters would sit down and be sure that the language expressed the same thought in each language.

Then when I went down to Nuremburg with General Echols (he was Clay's deputy) in this train. We went to the war crimes trials. Justice Jackson was the head of the group for the Americans. We sat up in the balcony and saw Goering and all these bad people in the dock. They didn't say much. Goering wasn't quite as large as you would picture him being because they weren't giving him any more than he had to eat. He couldn't have any extra food. He was in prison. Eventually he committed suicide, you know.

Swent: Yes.

Boyd: But we had lunch with Justice Jackson, and this was the first time in an international meeting that they had simultaneous translation. In other words, there would be somebody there behind a glass partition listening with earphones and then repeating, just as they do in the United Nations today, so that everybody could hear simultaneously what was being said by a witness. Justice Jackson told us--he came out of the Supreme Court, you know, to do this job--that if they hadn't had that, they would never have been able to hold that trial.

Swent: It would have taken four times as long, wouldn't it?

Boyd: That's right. General Echols and I went in and saw all that and had lunch with the justice, and saw all that being done. Of course, when I got to Munich I had an office in Munich taking care of the development of the rehabilitation of the industry there. There was a colonel down there who had charge of that through our organization.

Swent: The American zone included Frankfurt and Munich?

Boyd: Yes, that's right. The French had a little bit of a corner down the Saar, that area. The British had the northwest corner, and the Russians had everything east of the Elbe, the biggest hunk. We had to fly across the Russian zone to get to meetings in Berlin, you see. Fortunately we flew over most of it. Trains could get through, but every once in a while they would blockade it. General Clay had that wonderful airlift, and supplied that city by bringing even coal and food and things like that in there. That was after I left.

Boyd: They hadn't built the wall in my day. In fact, a couple of friends and I drove over in the Russian zone and we didn't see a Russian soldier for miles. We did see where they had taken the equipment out of the big power plants and then put them on trucks and one truck had gone in a ditch. We had a hard time getting enough power to run our operations in Berlin.

There was one building right in the British zone which was in pretty good shape. Here the Allied Control had its committee meetings. We had to drive through the Brandenberg Gate to get there.

Some Anecdotes About Russians and Americans

Boyd: One day I went with my Polish interpreter and my WAC secretary. There was a bus going through, and we heard a shot. What had happened was a Russian soldier had his gun with him getting on this bus. Someone grabbed for it and it went off and the bullet went through his leg. I sent my driver Smitty and the interpreter to take him to the hospital. He had to be taken to an American hospital and not to the Russian hospital because he wasn't supposed to be carrying that gun. He had a bad wound, but he didn't cry or anything. Helen Hasshagen was my secretary, and we walked among the Germans and Russians until they got back.

Then at one point we saw a Russian sergeant coming through with a two-horse-drawn wagon with the bells over the top. He had a canvas over this. We got him to tell us what's in there. He opened up the corner and he had a total bathroom in there, toilet, bathtub, shower, washbasin, things like that.

He said, "In my town, I'm a plumber. We don't have running water in my town, but we'll have the best bathroom in my town." We just saw him in the street. How he got away with it I don't know, but that's what we saw.

Then one occasion--I didn't see this, but it was reported to me--a Russian came over to a nightclub in the American zone and he got rather annoying, so one of our officers reported him to the Russian commandant. The Russian commandant sent for this man and said, "Is this the man that did it?"

This colonel said, "Yes," and the Russian picked up his gun and shot him, his own soldier, for misbehaving, disobeying orders. I mean, that's the way they operated then.

Then another time the garrison in the American zone was a paratroop regiment. They were the wildest people. They had to be reckless to even get in that business. I was with Clay one night

Boyd: and we heard eighteen or twenty shots around his house while we were sitting at dinner. He was worried about how we were going to get rid of all this.

About this time, they had found the great orchestra leader for the Berlin Orchestra and set him up so he could have the symphony going again. His driver didn't stop fast enough to satisfy the American soldiers, so they killed him. Clay called Eisenhower and said, "I want that outfit out of here." Within two days they had that whole division moved out of Berlin and regular infantry troops brought in.

Then I had a house near the Grüne Wald, and at night I could hear the handwagons trundling down. These were the wagons where they were picking up the dead bodies on the streets, people who died of starvation. They would take them out and they were burying them in a mass grave. Then I would drive over to the council meeting and you had to stop somewhere, and some very nice looking woman would come in and really beg. What do you do? Well, there was nothing you could do. You had set things up in order to have people fed and food moving, but you had to do this through the Germans themselves. You had no means of giving them any help.

Swent: You had mentioned that you had to learn about the German governmental system. You were doing all this through their own government?

Boyd: Yes. As much as you could you did through their own local government.

Swent: What still existed of their government?

Boyd: Well, the burgermeisters were still the mayors of their towns and cities. I had nothing to do with them.

Swent: Of course they were all Nazis, weren't they? I think they must have been. Anyone who was a burgermeister had to be a Nazi.

Boyd: Well, this was the problem. You had to pick up people who had a reputation. Fortunately a lot of them began to come out. Allen Dulles had been in charge of the espionage operations, the intelligence operations, and he had means of knowing who was trustworthy and who wasn't. We would be getting industrialists together and we would call up Allen or his staff members and we would pick from the people he would recommend. That's how they found Adenauer. And Willy Brandt. There was enough intelligence being developed to make some headway. There were pure Nazis or supporters of Hitler, and those which had opposed him. We had to weed those out and put them in where we could.

Swent: Was there an end point to this then, your level of industry, when you reached that goal then that would be when you would leave and turn it over completely to the Germans?

Boyd: Now you're getting beyond my time and when Jack McCloy took over from Clay, I had been gone a couple of years.

Leaving Germany

Swent: When did you leave?

Boyd: I was there only a year and a half.

Swent: Why did you leave?

Boyd: Clay wanted me to stay, but I had four, essentially five children to raise. I had been a country school teacher, or at least a professor at the Colorado School of Mines. It was time that I went back and established myself. I was still quite a young man. I was a full colonel at thirty-eight. I think it broke Clay's heart because he was still a captain at that age. He was only ten years older than I.

Swent: And you hadn't been home in all this time?

Boyd: I hadn't been home for a year and a half. When I got back from a recruiting trip I flew back home. When I came to the Pentagon Building, General Hilding by this time was the assistant secretary. Jack McCloy was gone. I remember he had bellowed down the hall of the Pentagon Building, "Boyd, where the hell have you been?"

Well, in the first place we had grounded all the airplanes because all the mechanics had high release numbers. They were getting out and we didn't have enough mechanics to maintain the planes, so they grounded them. So I had to come home by ship. There were six colonels in this one little tiny cabin not as big as this room. And decks. We played bridge in terrible weather all the way across. It took ten days to get across. Then I got down to Washington.

I did find Larry Wilkinson to take my place. He stayed with Clay after the war. He went to Continental Can. Last time I saw Larry was at Clay's funeral. But he came over to take my place so I could go home and establish myself for the future.

Swent: Let's see, your family was all in Denver then.

Boyd: They were all back in Denver then.

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Boyd: We were still in Germany, weren't we?

Swent: Well, we're just talking about your leaving. Is there more you want to say?

Boyd: No, I think we've covered it pretty well. You now get a feel for it.

Swent: Of course, some things are in the records, but mainly what we want from you are any things that might not be in the records.

Boyd: We had to deal with the British because they were in the Ruhr and they had the steel. We didn't have much of the industry in our zone. We had coal mines at Cologne, a big open pit brown coal mine, and we had to get these going. We had to run the railroad on bricquets of brown coal, and the train would run for maybe thirty miles and then it wasn't hot enough to keep steam up and they had to stop and generate more steam so they could go. We had to get fertilizer because the nitrogen had been used for munitions and it hadn't been put on the ground, and so we got the fertilizer plants going.

Well, you know there were so many things that had to be done and supervised. Then we had to deal with the Russians and the French and the British in the meantime. It was much easier to deal with the Russians than it was with the British because we disagreed on the language. The British--[laughs].

My British ancestry was known and I would frequently be invited to parties over in the British zone, and I would be the only American officer there.

Swent: So that was a help.

Boyd: Yes. The same way in Washington. I was working with Commodore Small on the War Production Board. I frequently found myself at parties where I was the only army officer present. The rest of them were naval.

Swent: So they sort of accepted you as one of them?

Boyd: Yes. That maybe was helpful.

Swent: Of course it was. And some of these contacts that you made then probably were helpful to you later in Washington and New York also, weren't they?

Boyd: Yes. Most of these people, of course, stayed either in Germany for quite a long time or they went back to industry. Jack Small became president of Emerson Electric, and so on.

Swent: So when you left Germany you went back to Colorado. Did you have a job waiting for you at the School of Mines?

Boyd: Well, Ben Parker was the president of the Colorado School of Mines. We had been partners before the war, both teaching geology, and when someone had a job to do then the other one would take over his classes. When the war came along, I guess Melvin Coolbaugh left after I went to Washington, and Ben came in to be the president. And he and I had been partners. Then he wanted me back as the dean. I thought long and hard about this, and he put the pressure on, and I said okay.

VII DEAN BOYD, COLORADO SCHOOL OF MINES, 1946-1947

Boyd: It wasn't going to pay very much with five children to support, but they would give us a house on the campus and so on. We finally decided that's what we would do. I was getting tired of all this pressure, this work that you had to go through in New York and Washington and Berlin and so forth. I could look for a more quiet life. So I agreed to go back as the dean, now that Ben had become president.

Swent: Did you think of it as a rather temporary thing?

Boyd: No. I thought it would be temporary because the deal really was that we would be in that position for just a few years, and he wanted to go back in the oil industry, and I would take over as president.

I went back to Colorado in 1946, and I spent the summer with my children. Hudson hardly knew me. The school had gone down from about 750 students to less than a hundred during the war. It began to build by getting GIs coming in, and suddenly we had 1200 students. We had to build faculty, find classrooms, set up schedules so we could take advantage of what facilities we had. We had to get these tough soldiers who came back to be students to re-establish the traditions of the school. Most of them had commissions in the army.

Swent: You could sympathize with what they were going through.

Boyd: Then we had to modernize the curriculum. We began to see what was coming on. Ben ran the school. We had a new business manager. I had a secretary, Ben had a secretary, and there were some girls in the business office. I was dean of the faculty responsible for academic matters, the dean of men, the dean of woman, and the director of admissions.

Swent: One woman?

Boyd: One woman [laughs]. Yes, we had one woman then. I learned all the names because they had pictures taken of these students. Pictures so that I could recognize their first names from these pictures when I went out on campus.

I hadn't been there for more than six months before I began to get pressure from Washington because "Cap" Krug (this big fellow on top there) [indicates photo on the wall] was secretary of the interior, and he was aware of the problems of raw materials and the troubles we had having materials suppliers, and how it limited our production, and so forth. He started after me to come back and take over the Bureau of Mines, because the director of the mines was a friend of John L. Lewis, and he was taking Lewis's side against the president when he struck the coal mines during the war.

So Mr. Truman and Cap decided they needed a new director of the Bureau of Mines, and they were going to fire him. They decided that Cap had known me, and I had worked with him, and he decided he wanted me on the job.

Swent: Where had you worked with him?

Boyd: First of all, he was head of the electric power division of the War Production Board, keeping the plants going and expanding them where they needed it and so forth. We had interchanged there when I went on the requirements committee, the program adjustment committee.

Then after this battle I told you about with Don Nelson, at one point the president, Roosevelt, had moved Mr. Nelson out. Somervell was traveling in Africa somewhere and Clay cabled him and said, "Nelson has been fired. May Clay now please go to war."

A cable came back from Somervell saying, "Does Clay want to follow Nelson?" Of course, he was being facetious, but he wasn't about to let Clay go, because someone would have had to do all these things that Clay was doing. I don't think I've ever told that story.

I don't suppose it matters now. Clay trained as a soldier and he wanted to be with troops. He was with troops of course later when he went into Cherbourg. But not at that point.

Swent: So Krug worked for--?

Boyd: Then when Nelson went, Krug was made chairman of the board. That's where we got much closer together. I took a trip around the country with him with Danny Silverberg, who was in the air force. He was another financial man from New York. I for the army, and Cap Krug. These two colonels that sat behind me who later became four-star and three-star generals. One of them wouldn't go back to a desk. He flew the first B-29 from Hawaii over the North Pole to Cairo. His

Boyd: job was to improve the efficiency of these planes and have them go a longer distance for the amount of fuel. They were the four-engine planes.

Eventually I did give in and went back to Washington as director. Cap came and said he wanted me to direct the Bureau of Mines. I then talked to Ben. I said, "What do I do?" The president put this heat on. It had gone through the president, not through Cap Krug. He called me out to Hollywood and we went down the strip and had dinner at these various places. They took care of the secretary and they gave us wonderful steaks and things like this.

Swent: Who called you to Hollywood?

Boyd: Cap Krug, to put the pressure on.

Swent: I see.

Boyd: So I went back to talk to Ben and we decided it probably was the thing I'd have to do.

VIII DIRECTOR, UNITED STATES BUREAU OF MINES, 1947-1951

Boyd: So I said, "Yes." Truman sent my name up on the [Capitol] Hill. I was asked to come back and appear before a congressional committee.

On the way back by train, a mine in Centralia, Illinois blew up and killed 127 people. This was the argument that John Lewis used to oppose my appointment.

I had never been before a congressional committee. Clay did all that kind of political work when I was there. I hardly knew how the Congress ran. I got down there and I didn't know you were supposed to make a speech. Here the Senate sat around waiting for me to talk. Finally they began to ask questions, so I stood up. They didn't approve me.

Serving By Interim Appointments

Swent: You were not confirmed?

Boyd: I got in and I went to work. They gave me a job as assistant to the secretary because they couldn't make me director because the Senate wouldn't agree. Later on I found out what caused all this. Senator Eugene Millikin from Colorado, when I came from Colorado, was the lawyer for John L. Lewis's group that was running a coal mine. It was a lady that ran it. She was Josephine Roach, her name was. Gosh, I haven't spoke these names in years. [laughs]

So he used that as an excuse to get to Millikin and to get to Ed Johnson, who was the other senator. When I mentioned this to my father-in-law, he said, "You know, Ed Johnson will say he's all for you, but when the time comes to vote, he will vote against you."

Well, they wouldn't vote. The rule was that the president couldn't keep me on after the Senate went out of session. And they went out of session soon after that, so he gave me an interim

James Boyd being sworn in on March 24, 1949 as Director of the Bureau of Mines by Chief Clerk Floyd Dotson as Secretary of the Interior Julius Krug looks on. Boyd served under a series of recess appointments from August 1947, and without pay after December 1947, until he received Senate confirmation, 50-11.

Photograph by U.S. Department of the Interior

Boyd: appointment. President Truman gave me five interim appointments, for each time the Congress would go out of session and come back and they hadn't approved me, he had to give me another interim appointment.

Swent: But you were not paid, as I understand, during that time?

Boyd: After the first six months when he gave me an interim appointment, then he couldn't pay me. The question is, "Do we give up?" Even my friends on the Hill tried to make me give up, my father-in-law and friends on the Hill and in the Rotary Club. Millikin told me later on that he got more correspondence about my appointment than any subject he ever had on the Hill. All of my friends would be writing to him. But John Lewis called a nationwide coal strike in opposition to my appointment and the Senate quickly confirmed me.

Defense Minerals Administrator, 1949-1951

Boyd: Then, of course, the Korean War came along, and the president decided that he didn't want to set up another War Production Board. He wanted to run the war through the departments. He put the raw materials through the Interior Department. I then became the defense minerals administrator. There were seven administrators doing various things appointed in the Commerce Department, and Interior. Five of us were Republicans. Truman didn't care whether you were Republicans or not, so long as you got the job done. That's how I got in a Democratic administration being a dyed-in-the-wool Republican. They all knew that. No one seemed to bother about it.

Swent: So you were moved over from the bureau to the defense minerals?

Boyd: No, I stayed in there. I remained director of the Bureau of Mines. Then the Korean War came along and that job was turned over to me to do, to be the defense minerals administrator. I stayed on as the director of the Bureau of Mines. I got paid as the director of the Bureau of Mines.

John L. Lewis

Swent: Let's go back to the Centralia disaster. This feud with Lewis was pretty well documented. That was in all the newspapers. But his big argument against you, he said you were incompetent and a few other things [laughs]. But the facts that he was flinging around were that there were so many mine deaths, so many more mine deaths

Swent: when you were in this job. Was this because the figures were suddenly inflated by this Centralia disaster, which actually happened just before you were really even on the job?

Boyd: No, Centralia happened on my way to Washington. In fact, there was only one major disaster in the coal mines all the time I was director of the Bureau of Mines. That was pure luck.

Swent: Well, part of it was due to you.

Boyd: A major disaster is one in which more than a few lives were lost. That one did take nine lives, but it was not an incorporated company. Let's go farther and finish the story. The bureau used to hold a combined mine rescue and first aid meet, in which they brought together the people from all over the industry. They hadn't held one since before the war.

Swent: It was like a contest, wasn't it?

Boyd: They were a real contest. They were very proud of them. The men used to really dig into those things. So I restarted it. It was the last thing I did before I left the bureau to go to industry. We had a meeting in Columbus, Ohio. Now John Lewis wasn't there, but all of his presidents were there. They invited me up to their room to have a drink after the banquet which I presided over. All of them came to me and one way or another said to me, "Look, we're sorry to see you go. We appreciate your cooperation, and we want you to know the battle wasn't personal."

So when he retired as president [of the UMW] I wrote him a note. I said although we disagreed politically I always respected what he had done for his people. He wrote back; that letter is in the Truman Library. I haven't got it. He said he felt that was a very generous letter after the way he treated me.

Swent: Indeed, after the way he treated you, yes.

Boyd: But you see, the people were pretty mad at him because they struck the coal mines when people were still in the jungles of the South Pacific and so forth. You couldn't have anybody who went and fought in the war very happy about what was happening back home. So he wasn't very popular. But nevertheless, he did well for his people.

The Origin of the Bureau

Swent: When you took over the bureau then, here you were stepping into a long-standing agency.

Boyd: Formed in 1911 under the pressure from the Mining and Metallurgical Society of America. This was the first time the industry really realized that something had to be done about the fact that we were killing twelve to fifteen hundred men a year in the coal mines.

Swent: So really safety was the impetus?

Boyd: That was the impetus, and the Bureau of Mines was formed out of parts of the Geological Survey, and set up as a separate bureau. It was given the economic functions as well as the safety functions. The bureau then began to study very carefully the problems in safety. They knew there were the fire and explosion problems, and the falls of roof and coal, and transportation accidents and so on. The bureau was never given any authority except that they were not allowed to be kept out of any mine that had an accident. A bureau representative had to be let in to examine that accident. That was the only authority they had, and of course the research to find the causes and describe the methods of prevention for the state inspectors to enforce.

Research on Mine Accidents

Swent: And was it mainly coal that they were interested in at that point?

Boyd: No, there was the whole mining industry, but coal was where the real problem was. It really was a problem. It was dreadful, dreadful.

I called in the head of the safety division, and he was a dedicated man. He had been a classmate of my father-in-law in Denver. He had given his whole life to this. He had gone down into the mine during and after disasters and really faced the issues himself. And in fact he had made contributions to mine safety.

Swent: What was his name?

Boyd: His name was Dan Harrington. I said, "Dan, bring your statistics with you. Where are people killed in coal mines?"

"Falls of roof and coal, transportation accidents, fires and explosions, in that order."

I said, "What are you doing about it?"

He said, "Fires and explosions are the bureau's job."

Well, I knew I wasn't going to argue with him because he was going to retire in six months, so I sent him back and went about other things I had to do. I picked a fellow by the name of Jack

Boyd: Forbes to take his place. I called Forbes in and I said, "Look, these are the scientific engineering problems. You are going to set up a group of people who will study the causes of these accidents. Not the fires and explosions, because they've done all their work on that." There weren't very many fires and explosions then, and we knew how to prevent them. If they ever happened it was because somebody hadn't followed the rules.

But the bureau didn't have any authority to enforce any of these things. Their only authority was to study, to research, draw up recommendations that the state inspectors would follow through, and to demonstrate and to teach. They went around and instructed people in these things. They had railroad cars with all the equipment in them. If a fire or explosion took place, they could go right to the mine.

After Dan left I called Jack Forbes in and I said, "Now this is what I want. Let's go after falls of roof and coal first. How does the coal fall, what do you have to prevent it, and so forth."

Developing Roof Bolts

Boyd: Remember, they used to have mines full of timbers, poles, and caps, things like that. So he came back and said, "Well, what we think we better be doing now is drilling holes in the roof, putting a bolt in there, and holding--see the coal mines have bedded formations, a layer in beds of shale, sandstone, and so on. You drill up through the bed above the coal and you bolt them together. Then you make a beam. So the roof bolt as a standard mechanism came out of that study.

The Bureau Should Not Be an Enforcement Agency

Boyd: Then I began to find out that the state inspectors said they wouldn't approve any roof bolting unless we who were in the Bureau of Mines approved it. I said, "Nothing doing. We're not policemen. We're scientists and engineers. We will teach you how and we will study it and see whether you did it right, but <u>you</u> have got to be enforcers." The Bureau of Mines must continue to be the court of last resort.

Well, John Lewis and his boys, they wanted to use safety as a negotiating tool. They concentrated on how many people were killed in each period. They hadn't noticed or wanted to face the fact that the rate of accidents had been dropping off steadily like this

Boyd: [gesture] since the bureau had taken over. The curve looked like this the three or four years while we were studying, and then this curve began to go down towards zero. But you're never going to get to zero because you've got people working in hazardous conditions and somebody is going to get hurt, they--both workers and managers--get careless. We were well down the line by the time I came in, and all the time I was in there that curve continued in that direction. Then it becomes asymptotic, it goes out towards the bottom.

I simply opposed having the federal government take on the policing responsibility. They put this bill up every year, and somehow or other as long as I was director of the Bureau of Mines the report never got to the Hill until it was too late to do anything about it.

Swent: This is the bill that you would have enforcement powers?

Boyd: Yes. I fought it off, and my successors fought it off a while until Jimmy Carter came along. Then he trotted over to the Labor Department and they went up and got the mine enforcement in the Labor Department. Now they will go back and say--for instance I read a report the other day that said, "Last year was the lowest fatality rate in the history of coal mines."

Well, the production rate was down, number one. Number two, I think we had already got the rate down to the asymptotic part of the curve. The cost of those inspections were unbelievable. It doubled the price of coal because they had to have so many people to do it. I had a report from my successor at White Pine where he had to keep five engineers available to go around and be with the inspectors who would come down and see that mine. And yet we had one of the best records in the country. One year the best one; we won the safety award. When I went in there, we had five fatalities the first year I got there.

Swent: At White Pine?

Boyd: At White Pine. Of course this can't be. The first thing I did was to engage a fine safety engineer, and Jim Richardson was searching for me. Within a year or two if we had one accident, not a fatality, we were very annoyed. Usually it was through carelessness on somebody's part.

Chairman, Interdepartmental Committee for Resources

Boyd: When I first went back to Washington, Secretary Krug, the Secretary of the Interior, gave me a job as a consultant to the secretary. About this time General Marshall, Secretary Marshall, had announced

Boyd: the Marshall Plan for Europe. Mr. Krug asked me to be the chairman of the interdepartmental committee which would study the availablility of resources, to see whether we were strong enough in resources to put on a program such as the Marshall Plan. We had members from the State Department.

Swent: Excuse me, I want to be clear on this. This was before you received your confirmation as director of the Bureau of Mines?

Boyd: Before I went down to go to work in the bureau itself they had this job to do and they wanted me to do it. Remember, Krug had asked me to come because he was concerned with the fact that the government's materials policies weren't very sound. We got caught in the war without a stockpile, so we had difficulty finding and spending a lot of energy and resources, and ships and so forth, to get raw materials for the war effort. So he was most anxious, as former head of the War Production Board. He was concerned about that and he wanted somebody to work on that. I had worked on it with him during the time he was over there during the war.

Swent: But now this is post-war and he was thinking that we didn't want to get caught in that same spot again?

Boyd: That's right.

Swent: This was before the Korean War?

Boyd: This is before the Korean War.

Swent: Could you see it coming?

Boyd: See the Korean War coming? No, not yet. So they formed a series of interdepartmental committees to work on this and I was given the chairmanship of the departmental committee on resources. I had a man who was on the secretary's staff, Arthur Goldsmith, and he did most of the work, but I was still working with the secretary on the bureau's problems.

We studied and wrote a report on the availability of raw materials and whether we could stand a big program of rehabilitating Europe, for example, for the Marshall Plan.

Swent: Did this include things like food and fibers?

Boyd: No, it was resources. I think there was a food committee, but I didn't have anything much to do with that. So I was watching what the bureau was doing. I was very friendly with the director of the Bureau of Mines. He was a [medical] doctor, by the way. He had been brought in there before because of the safety program, and he was a great friend of John L. Lewis's. Because he was working with

Boyd: John L. Lewis, who had been not very friendly with President Truman, they felt they had to pass him over. The name was Sears, a very nice man. I got to know him quite well.

Opposition from John L. Lewis

Boyd: One of the committees working on this was in the Commerce Department to see how we would take it from the industrial point of view what kind of programs should be. One day I was sitting there at lunch. Across the table from me was George Meany. Remember, Meany was the head of the AFL-CIO. He told me then that Lewis had a man working full time to see that I didn't get appointed. About that time, after all the studies--and they had one man working full time--what they found was the fact that I was not legally a citizen, in their opinion, that I was past twenty-one when my father became a citizen. Therefore I wasn't legally a citizen. He had a big show and brought all the press in and made this great thing.

So the press came over to see me. Fortunately I had my father's naturalization certificate on my desk. I didn't say a word. I just handed it over to them. What had happened is that somehow in the transmission to the Congress the wrong date of my birth was submitted. Dad was naturalized and finished naturalization before I became twenty-one, and so I was a citizen. So these headlines came out, and down on the bottom all the press people pointed out that the date was wrong and that I was perfectly legal. I learned from that that the important thing to do is to keep my mouth shut, not to get into an argument with Lewis in public. The press were all really on my side. They weren't very happy with Mr. Lewis and his strike.

Support from President Harry Truman

Boyd: Then as we went along they had a nationwide strike. They had just passed the Taft-Hartley Act. They had struck the coal mines, and we had in the bureau--by this time the president had given me an interim appointment. I'd better tell you about that first, get it in order.

The president sent word to me one day that he wanted me to go over to the Atomic Energy Commission and take charge of the raw materials program.

Boyd: So I went over to the White House and had about an hour with him, half an hour, I guess. We started off talking about how everybody seemed to want the president to fight a preventive war with Russia, to go to war with them.

I said, "I don't think war has ever solved problems like this." That's the kind of question that we talked about.

Then he said he would like me to do this thing on the atomic energy. I said, "Well, Cap's out of town. He brought me here. Don't you think he should—I wouldn't want to back out without him knowing it."

Swent: Now this is you talking to President Truman?

Boyd: Truman, yes. He said that was fair enough. Cap was back in a couple of days, and I went over to see him and told him what the situation was. He trotted right over to the White House and he pointed out to the president how important it was. The president said, "All right, we'll give Boyd the choice. Either he goes into the Atomic Energy Commission as the director of raw materials or he sticks to the fight." In other words, he was willing to go for the battle.

They gave me twenty-four hours to make up my mind. I called Ruth on the phone and said this is the situation. She said, "Jimmy, I don't want you to back out on a fight."

I said, "That's what I want to hear, because after all this may be quite a battle." I immediately sent word back to the White House that I would continue on an interim appointment. So they gave me an interim appointment and I then went down to the bureau to go to work. We hadn't yet finished this report. I did both things from there on.

Swent: That was when the article appeared in Collier's? [June 4, 1949]

Boyd: No, no. It was two years, well over a year, before that happened. He had to give me four interim appointments. Every time the Congress would go out of session and hadn't acted then they hadn't approved me so he couldn't give me the appointment, so he would have to give me another interim appointment. I don't know where they are. They must be upstairs somewhere, these big appointment sheets with Truman's signature on them.

The Organization of the Department of the Interior

Boyd: At that time there wasn't an assistant secretary for materials affairs, or for mining or resources.

Swent: This is in the Interior Department?

Boyd: Interior. Cap wanted me essentially to be doing interdepartmental work as it was arising.

Obtaining Manganese

Boyd: The first thing that came along was the fact that the Russians cut off selling us manganese from down through the Black Sea. You need fourteen pounds of manganese to make a ton of steel. We didn't have much production here except from very meager sources, and there was some in the stockpile. So the steel industry was in real trouble. We set up an interdepartmental committee to solve that problem and I was chairman of that.

Using Parliamentary Procedure

Boyd: I did something that is rarely done in Washington. I ran meetings by Robert's "Rules of Order." I insisted that people, when they talked, they talked to a subject, and the subject would be presented as a motion so we could get answers. In my experience, that was very unusual. You just had bull sessions, and somehow or other you would come to a conclusion.

But what we did was to make arrangements in Africa and in Brazil for the opening of these mines, and we had to provide railroad trains and equipment and things like that. Here I had State Department people on my committee, Commerce Department people, and so on. We worked out the program to get manganese flowing in, and we had an advisory committee from industry behind us that I could talk to, to be sure we were going in the right direction, for the industry had to undertake the needed actions.

Swent: And this was something new to have this kind of setup?

Boyd: Well, no, this happened frequently. Interdepartmental committees were set up where each department had to do something, go to a political or a diplomatic discussion or have to go to do something, like the Commerce Department about the railroad equipment, and so on.

Boyd: There were hundreds of things that had to be done. I would just listen to the discussion, have a motion, and then point out what each of the departments had to do. They did what they were supposed to do and we got it turned around. The manganese began to flow, so that problem was solved.

But this was the kind of thing that they wanted me to do. So beside running the Bureau of Mines, I was sort of being an assistant secretary. Because I wasn't an assistant secretary then.

The Hoover Commission

Boyd: The Hoover Commission came along at that time to talk about the organization of government, and they set up there in the departments at his recommendation a series of assistant secretaries who had charge of these various things. One of them was assistant secretary for minerals. But that was after Cap Krug had left. Oscar Chapman became secretary and he asked me to take that job. Well, I was a Republican and this was a Democratic administration, and I felt that was the wrong thing for me to do. I asked if they would leave me running the Bureau of Mines.

Swent: So this was a person who was put in between the director of the bureau and the secretary?

Boyd: Yes. So I would rather pay full attention to what I had to do in the bureau to get re-organized. I went around, and I'm sure I'm the first director of the Bureau of Mines who went around to the 125 stations that we had, such as safety stations back in the hills of West Virginia, or up in Alaska. The result is I met some very interesting people. I began to realize then that we needed a different kind of organization in the bureau, and I worked up the organization, went through the Bureau of the Budget, and the secretary approved it. We formed a series of regional assistant directors. There's a picture of those people on the wall. We set up in various parts of the country.

A New Bureau Organization with Nine Regional Directors

Swent: And this was new?

Boyd: This was a new structure of organization. We had these people dealing then with the industry out in the field. One of these men was Elmer Pehrson. He had been director of economics, or the head of the economics division, as an economist, although he was a mining

Boyd: engineer. I made him head of the region which would deal with our foreign affairs. We had very few people in the embassies in countries where the most important materials were being produced. The State Department didn't like these people, but we needed to have some very good people in there. We only had five of them to cover the world. Nevertheless I got Pehrson in charge of that, and he was so angry with it he wouldn't even talk to me. We went up to a meeting at the University of Michigan, and he wouldn't even come the day I was there. He went a different day.

Swent: Pehrson?

Boyd: Pehrson. Later on we became close friends. But he was so angry.

Swent: I'd better clarify that just a little. Why was he so angry?

Boyd: Because I had taken his job away from him as head of economics and put him into a different job. I eliminated his job, really. The next thing I did was to take the great scientists, like the metallurgist we had aboard, who had done wonderful things. He used to go home with a briefcase just loaded this full every night, the way I did. He was just so upset that I took his job as head of a branch of a bureau and put him in as the chief metallurgist, thus relieving him of administrative work. He was a lousy administrator.

He was very unhappy. But in six months he came back and said, "Jim, I realize what you did for me." Because then he could talk all day and do the things that were necessary to get the metallurgical work going here and there and he didn't have the administrative problems that a branch chief would have.

Swent: What was his name, do you remember?

Boyd: [makes searching noises] I've got them all down here. It's funny it didn't come very quickly, because these really, of course, eventually became close friends of mine. No, these are the regional directors. I'm talking now about the chief scientists.

Then I took the chief [of] the fuels branch, and made him the chief fuel engineer. The branch chiefs were running the bureau from Washington, and didn't know what was going on out in the field, so I wanted the regional directors so that they could deal with the industry, deal with the public, out in the field and be closer to the actual things that were happening rather than having some branch chief up in Washington run it. But people don't like to have these powers taken away from them.

This fuels engineer was getting on for seventy. I did that to him too, and he wasn't quite as upset about it, but he came to me and told me how pleased he was after he had worked with it a while. He said it was a fine job.

Boyd: To do that I had to go and get approval from the Civil Service Commission, because there's a tendency to give a man responsibilities, and his salary depends on how many people he has working for him. Well, this way he didn't have anyone except a secretary working for him. He was free to come and go as he pleased and get into work when he wanted to. So the director of the Geological Survey and I worked with the Civil Service Commission and we established these senior positions where we could have top scientist who could be doing scientific work and weren't stuck with administration, which most of them were pretty lousy with.

So there were nine regional directors. That was the organization.

Swent: You were actually broadening the scope of the bureau's activities, then?

Boyd: Yes. Nevertheless, our biggest branch was the safety branch. That then was run by this man I told you was my father-in-law's classmate in East High School in Denver, Dan Harrington. So we're coming back to where I was talking to you before.

I guess it was my scientific training that made me do these things, to show the importance of science and how you went about administering the science things and not wasting the time of the great scientists in the detailed administration of manpower and so forth. That's what it really amounted to. And the secretary approved it. It's changed four or five times since then.

Let's go back to the safety. I think I mentioned this. I told you about the roof bolts?

Swent: Yes.

Boyd: Well, that was an outcome of that. I don't know how many lives that saved, because today in a coal mine you don't find these wooden props all over the place. You usually see these things bolted up. One of my associates developed a new roof bolt that was easier to drive and stay in place, and more persistent. It stayed right where it was. It expanded. You forced it into a hole so that the pressure against the walls of the hole were such that you couldn't pull it out.

Swent: Was this an adaptation from hardrock mining, of the rock bolts that you use there?

Boyd: No. The rock bolts really came out of the coal mine. Later on people began to use it in hardrock mines, too, but the coal mines all had to be propped up by wooden props to be able to hold that back up. In coal mining the roof is called the back. These were used in the Tri-State District, because remember they had enormously

Boyd: high roofs. They had to be able to watch the roof all the time to be sure there wasn't loose rock that would fall on people's heads. They put roof bolts into the roof and then attached catwalks so that people could go up there and break off loose rock. But it wasn't done to support the back. It was done just to have access to the back. The rock bolt came out of this work. The point of the matter is what I told them to do is to get geologists and rock mechanics people, and engineers, and set up a very close study of it. Out of that evolved this concept of strengthening the rock by bolting it together. That wasn't what had happened before. The other thing was just a means of having access to the roof up high.

Research Bureaus

Swent: Did you do any research through universities?

Boyd: Oh yes. We didn't do as much as we should. There was opposition in the bureau to let contracts at the universities, and that was a battle I had. One of these in particular, Zimmberly, was opposed to have any bureau money going out to the universities. I had to battle with him in order to get that across.

Swent: So you set up your own program within the bureau?

Boyd: It was all done. We had several research units in different stations. And we had too many of them. An example was in Utah we had a research station on the campus of the University of Utah. They were doing everything. They were doing physical metallurgy work. Well, Salt Lake City was the center of the mining industry. I wanted them to do research on mining methods and recovery of metals and things like that. There was no big metallurgical industry [there], so I wanted to concentrate that metallurgical work in College Park, Maryland, closer to the steel industry and others where they could get closer together and we could concentrate our physical metallurgists there.

Well, the local chief of the station took this to the one congressman and two senators of Utah. I got called on the Hill and dressed down very firmly. I knew where this was coming from. I said to them, "Look, you put me in here to improve the operations of this bureau. Why do I scatter it around? What I want to do is to make Salt Lake City the center of the hydro-metallurgical field. This will do all our major work. It applies to what you do in Utah. Why should you be mixing it up with something which doesn't apply?"

Well, the station chief was very much upset about that of course, but we did. We concentrated our physical metallurgic work in the University of Maryland on the campus where we had a station.

Boyd: And we then built up the laboratories next door to Kennecott's operations. Finally the chief began to see the light. He gave in and didn't play political tricks behind my back, left the Bureau of Mines, and after I left he went to work for Kennecott as the research director there. I turned that guy that was an enemy into a friend.

Problems with Politicians

Swent: I'm reminded of the story that Truman said about Eisenhower that, "When he gets to Washington he'll find out how hard it is to get things done. It's not like the army where you say, 'do it,' and they do it."

Boyd: Exactly.

Swent: You ran into this too.

Senator Scott Lucas

Boyd: I told you the story about Scott Lucas? [Senator from Illinois]

Swent: I'm not sure that you did.

Boyd: Well, I went up to see him one time and he said that his coal industry was having trouble with coal mine inspectors. I told him, "Yes, your state is the worst state in the Union."

He was reading the newspaper. He put it down and he told me the above story. I said, "And as long as I'm director of the Bureau of Mines, I'm going to have to put my best inspectors in there," because they were doing all kinds of things the bureau clearly said you must not do. You didn't for instance run your trains on the outby air, the air coming out of the mine. That's a coal mining expression, "outby air" and "inby air." Methane generated in the mine was contained in the outby air and could be ignited by sparks from the electric trains. In Illinois they were hauling on the outby air. That kind of thing they were doing.

He looked at me, saw the glint in my eye, and he picked up his newspaper. I never heard any more from him.

Governor-Elect Adlai Stevenson

Boyd: Then later on the governor-elect of Illinois, Adlai Stevenson, came to see me. He went to see the Secretary [of the Interior] and the secretary sent him down to see me. He said the worst state problem he had in Illinois was mine safety.

I said, "Yes, sir. You've got the worst state in the Union."

He said, "What do I do about it?"

I said, "Well, you do three things. Number one, you take your director of safety out of politics. I'll give you the list of people who could do the job in Illinois that you could choose from. I won't tell you who to pick, but I'll tell you those people who would be qualified. And I'll give you a blacklist, those under no circumstances who should do it.

"Second, you've got to rewrite your state law. Your state law is archaic and old. If you like, we'll rewrite your state law for you. Then you should take your inspection service out of politics, have your inspectors pass examinations and be chosen that way," because up until this time the inspection was done by the states. They were the only ones that had authority to enforce rules. So each state had to have its own safety rules, and they were based widely on the recommendations of the Bureau of Mines.

So he said, "Thank you," and he went off. So we did these things for him.

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Boyd: The first thing he did, the chief inspector died and he appointed a man on the blacklist. The second, as far as I know he never put either of the two other suggestions that we had prepared for him up to the legislature. In other words, his coal people were too strong for him. Politically he couldn't get away with those things.

The next time I saw Adlai Stevenson he was in the United Nations. Remember, he went there. I rode up in the elevator with him in the Waldorf Astoria as I was going up to see President Herbert Hoover. He had the grace to blush. He recognized me. I don't blame him. I think his politics were too great for him. He wasn't a great politician. He was a very fine intellect, though I didn't agree with the way he did things. He was too good a man to stand what politics required. Those are illustrations of the kind of problem.

A Pennsylvania Congressman

Boyd: Another example was a congressman from eastern Pennsylvania, in the anthracite region, who called me up to his office. He said that the trouble was that I had an office in his district and none of the members of the office were Democrats.

I said, "Well Congressman, I'm not allowed to ask if they're Democrats or not. If you've got some good Democrats up there who can pass the examination we would be happy to appoint them."

This went on, and about that time a telephone called in. He kicked me out of his office while he answered his telephone call. I went back to Tom Miller, who was my assistant director, deputy director, I guess. I said, "I want to go home and bathe. I feel dirty."

All he said was, "Jim, there're are so many sons of bitches in this country, they're entitled to representation in Congress."

He stayed there for years, and then he got into trouble years later. I don't know how it happened, whether he had to resign, or he didn't run again. Those are the kind of political problems we had.

Relationships with Others

The United States Geological Survey

Boyd: Then the next thing that I was concerned about was the fact that the Geological Survey and the Bureau of Mines needed to work very closely because we were coming then up towards the Korean War. It was very important that the geological people and the Bureau of Mines worked together. When I got there I would say, "Now what does so-and-so in the Geological Survey think about this?"

Swent: This was for locating materials?

Boyd: Locating materials, prospecting, and doing geological field work.

Swent: Inventory and stockpile?

Boyd: Yes, and things like that. Whether or not the metallurgical processes were available to recover those resources, all kinds of things like that. We got two of our people. Julian Feiss, he was my assistant, and a very interesting man in the Geological Survey. They worked together and they wrote up the agreement between us.

Swent: There really is overlapping there naturally, isn't there?

Boyd: Overlapping is not the term, more a symbiotic relationship. The need to live together. You had to work together. If you go into a district it was just as important to know the feasibility of mining the ore as to know whether it was there. We had a publication procedure by which the bureau and the Geological Survey would work together.

Well, we bumped heads together. William Wrather was the director of the Geological Survey. By this time we had an assistant secretary, as the Hoover recommendations were accepted. We would have lunch together, the director of the Geological Survey, and the Bureau of Land Management, and the Bureau of Mines. We would discuss the problems. We didn't have a strict agenda, but we would bring the assistant secretary up to date.

Then when the Korean War came along this was all set up. We had the law set up government agencies to further the advancement of setting up mines or in the arrangement for mines in the area. The Geological Survey and the Bureau of Mines had to work together. Invariably the head man was picked by the other bureau. A man would always stand out in an area. One place would be a Bureau of Mines man, another place would be a Geological Survey man. The men themselves recognized the need, and they would recognize who among themselves was the natural leader of that area. That worked very well.

State Agencies

Swent: Did you ever have any conflict or lack of significant conflict with the state organizations? Were there state directors of mining? For example, California has a Division of Mines and Geology.

Boyd: No. That association was very close. We had our office in San Francisco and we worked with the director there. I don't remember. We didn't even have trouble with the state safety inspectors. But when it came up to the point when we got these roof bolts going, for instance, one of the biggest mining states is Pennsylvania. They came to me, and their chief said, "I want the Bureau of Mines to approve anything I approve."

I said, "No. We're not an enforcement agency. We'll do the research work, we'll write the regulations, we'll come and teach you how to do these things and know what to do, but you are the responsibility. It isn't in the federal government, and I don't want it there. It shouldn't be there."

Swent: I think it is more now, isn't it?

Boyd: Oh yes.

The Department of Labor; the Tragedy of Using Safety Enforcement as a Negotiating Tool

Swent: That has changed.

Boyd: Particularly in safety. Regulation and enforcement have been taken out of the bureau entirely. The safety regulation is now over in the Labor Department. Tragic. Costly. Enormously costly. Of course, I was at loggerheads with John L. Lewis, because he was fighting to get this done, and they were blaming the accident rates on us. But what they really wanted was to get federal inspectors in so they could maneuver them and use it as a bargaining tool in labor negotiations. They would never admit that, but that was clear what they were doing. They knew what I was doing, and they knew that they weren't going to get that law through as long as I was director of the Bureau of Mines. It took them a number of years after I left before they did get it through.

Swent: This might be a good place for you to mention something you told me off the tape, about an accident where they didn't want to let your inspector in.

Boyd: The only time that I ever had to enforce the law, take an enforcing action, was with a mine down--I think it was in Texas--that had an accident and our inspector went down to do what we normally did, go and inspect the thing. The mine manager refused to let him in. I called the attorney general, or the district attorney I guess it was, and told him. That's all I had to do. They went ahead and did it. They knew what the law was.

That's the only case where I had to exercise authority. Usually mines would welcome your people in to study the thing for them, knowing your people would know better than they would what happened, and would be able to write an unbiased report. Those reports were vital. You didn't want your inspectors to be policemen. They were researchers, they were specialists, engineers, and scientists, and they were doing it. They had no axe to grind except to get their job done right. As soon as you make the inspectors have policing authority, you change their whole position.

Swent: The whole citation system has come in since then.

Boyd: Yes. So that's why I fought it. As long as I was there it never happened, and Lewis's boys knew that it wouldn't happen. But in the meantime I worked very closely with their safety director. His name was Ferguson, and he would be in my office every month or so having a discussion about this, that, and the other. If they had any problems with the safety questions, they would help me straighten it out.

Swent: Even at the time that John L. Lewis was still opposing you?

Boyd: Yes.

Swent: That's interesting.

Boyd: Who was the fellow that was convicted of murder? He succeeded John L. Lewis as president, if you know his case.

Swent: I don't remember.

Boyd: It will occur to me in a while. Anyway, in my day he was Lewis's assistant. It was second man, heir apparent, I guess. Isn't that funny; his name won't come to me. But we seemed to be very close friends. In Minneapolis we met in the airport and we threw our arms around each other. All my people were just horrified to see me playing footsie with the [United] Mine Workers. But I never allowed that to become a personal matter, even though they were keeping me without salary and giving me trouble, it never became personal.

Swent: That's a real credit to you. It was how many months then, eventually?

Boyd: It was two years to the month from the time I was appointed until the time I was confirmed.

Swent: And a great deal of that time you were serving without a salary.

Boyd: That's right. About eighteen months I was serving without. They had to pay me all at once.

President Truman

Boyd: In the meantime Mr. Truman had done what he had to do and that was lift all regulations on price control and things like that, so we had a little upsurge in inflation. But then it leveled up again. But to recover from the interference for the economic system that took place during the war. You had to get those price control and things lifted, and Truman had the courage to do that.

Swent: It sounds as if you admired Truman.

Boyd: Although I'm Republican, I did admire him. I always admired him. Yes, that's right.

Swent: You said you never met Roosevelt.

Boyd: Never met. I never saw him. But I told you the story about when I first got to the office in the State Department Building. There was a note. The undersecretary came up to my desk and said, "Dear Bob, do so-and-so, FDR," and I had to go and do it. That was my first introduction to doing something for the White House. It was quite an experience for a man coming in from the sticks.

Swent: But you saw Truman several times, I suppose?

Boyd: Well, yes, because he used to come over quite regularly and have lunch with the secretary and his directors, keep him up to date. One example was I was sitting at the end of this table one time and the Secretary Krug was leaving. Chapman was coming on, and the secretary wanted each of us to tell what we had done for our bureau the last year or so. I was the last in line. Each one of them, his great accomplishments were how much more money he got out of the Congress. I got madder and madder. Finally it got to me and I said—I've forgotten how I put it now, but I was proud of the fact that my budget was less, that we were doing more, that we had accomplished this and we had accomplished that.

Swent: That's not the right bureaucratic thing to say, is it?

Boyd: Well, I think the president approved of it.

Swent: You were able to do this restructuring and still not expand your budget?

Boyd: That's right.

Swent: That's amazing, isn't it?

Improving the Raw Materials Situation

Boyd: Well, I realize now there were things I should have fought more for money. I had to fight for money. But I didn't fight for money unless I felt that there was something that was urgently needed to be done. Remember that I was there to improve the raw materials situation, so we were doing research in such things as titanium, of manganese, of iron-steel metallurgy. The steel industry had pulled out from behind our cooperative agreement and they were doing it on

Boyd: their own. They weren't doing it nearly as well as they had done when the bureau was doing it working with them and running the show, because they could never get together on what kind of furnace they were going to use and so forth. People in U.S. Steel later on admitted they would have been better off if they had stayed with us.

Titanium

Boyd: During my time--I didn't initiate these things. This work was going on before I got there, so I'm not bragging that I did this, but during my period we brought titanium to the threshold of industrial development.

Do you know what titanium looks like?

Swent: No.

Boyd: [opening drawer] This is some of the first titanium that was produced by the Bureau of Mines.

Swent: I think most people don't have titanium in their desk drawers.

Boyd: Now that's stronger. See how light it is.

Swent: Is this just titanium?

Boyd: That's just pure titanium.

Swent: Oh my. It's heavy.

Boyd: Yes, but it's lighter than steel and it's stronger than steel per pound by a long way.

Swent: This is a letter opener that looks like stainless steel, actually.

Boyd: It looks like it, but it's titanium. If that was a piece of iron it would be heavier than that. Without that we wouldn't have jet engines that we have today. There was a European that we brought into the Bureau of Mines who had invented a method of separating titanium. It comes with great difficulty. It's a common metal in the earth's crust, but it's very difficult to separate. It comes as titanium oxide, TiO_2. To separate the oxygen from the titanium is a very difficult process. You have to do it in a vacuum and you have to do it at high temperatures. You dissolve it in a salt. This is what it looked like during the process. You can see the titanium coming out. [shows a sample]

Swent: It's bluish. It looks almost like a copper salt, doesn't it?

Boyd: Yes, it is a copper carbonate green, but it is titanium metal in salt, NaCl. In the process the titanium was dissolved in salt; then in a vacuum you separated the titanium out by dissolving the salt in water. Titanium is corrosion resistant, stands high temperatures, and is lighter and stronger than steel for its volume by quite a long way. The industry has had its ups and downs. A new industry with special expensive qualities has demands that change. Later on when I had retired I was working on a titanium committee for the Academy of Sciences. My research director when I was at Copper Range was the chairman. He wanted me on there. We went around and visited all these plants when the industry was going.

Manganese

Boyd: Then we finished up the work the bureau had done on manganese, to separate manganese, improve the methods for producing the metal from lower grade sources, and using pure manganese and things like that. That was done in my day.

Coal Gasification

Boyd: Then the biggest thing we did in terms of money was to bring the making of oil and gas out of coal. We had large appropriations. This is the gasification of coal and the liquification of coal into petroleum. The bureau had two big research plants. We had done this work, and showed the science of it, that it could be done. We demonstrated that it could be done, and I thought that was as far as the government should go. Of course, those who were doing it in the bureau weren't very happy about reducing the emphasis on it. I didn't think the government ought to be putting pilot plants in; that should be left to industry. The bureau had two big pilot plants operating. We were doing the research work, oil from shale in Colorado. We had big plants doing that. It was up to industry then to take this technology and to develop the industry, and we shouldn't be doing it. So I didn't put my strength behind these things. I didn't think that was the thing for us to do. I was pretty firm in my convictions. I got some enemies out of that, I'm sure. But we were now facing mobilization for war.

The Korean War

Boyd: When the Korean War came along and the president wanted to keep the control of running the effort in the government agencies, then they needed a minerals administrator, and they made me that. That meant that I would have to approve building plants to get gas from coal, if we needed them. One of the first things that appeared was that we needed benzene. The oil refineries weren't producing enough of it.

Swent: Did the Korean War interrupt our materials policy--we weren't importing anything from Korea anyway, were we?

Boyd: No, not from Korea, but we had the same--

Swent: How did this affect our materials situation?

Boyd: The Korean War didn't have the kinds of things we had in World War II, such as enemy submarines sinking our ships bringing bauxite from Jamaica.

Expanding Copper Production

Swent: Our whole resource picture was interrupted there, wasn't it?

Boyd: Yes. But we still didn't have enough copper and we had to expand our copper industry. We were given the job. As the defense minerals administrator, I had to work with the industry and see where we needed to expand copper and give them the powers that the Congress authorized, like rapid depreciation, loans from the RFC, whatever was needed to bring a lower grade deposit into production.

One of these was Copper Range, or the White Pine [Michigan] deposit, which was a large copper deposit. I sent five engineers up to study this deposit and they came back, three on the contrary and two of them for it. With my deputy, James Douglas, we felt the need was there, so I overruled that committee and approved a program, not realizing that I would have to go and prove I was right someday. I had no concept that some twelve years later I would be asked to manage the company that owned it.

With that approval the company would be granted a loan from the Reconstruction Finance Corporation and things like this, so that they were able then to raise the funds to expand that mine, put the mine, mill and smelter into operation. They had quite a struggle. A man by the name of Maurice LeCroix was the president at that time. I worked with him. He brought it to us, and my copper people, except for this group that had disapproved of it, agreed. I told you about Ambassador Louis Douglas, I talked with him when I was in Germany.

Swent: In Europe, in Germany, yes.

Boyd: His brother was Jim, and Jim Douglas came to Washington to be the assistant director of the Defense Minerals Administration.

Swent: From Arizona?

Boyd: Yes. And Jim agreed that we ought to go ahead with that, so we did. It was years later after I had been with Kennecott for ten years before they came to me and said, "Well, you better come up and run it."

Swent: Now the Defense Minerals Administration reported to--

Boyd: It was a bureau, essentially, inside the Interior Department.

Swent: I see. So you reported then--

Boyd: To the Secretary of the Interior. But in the White House there was the Office of Production Management. That was run by Charles Wilson. That was "Engine Charlie." There were two Charlie Wilsons. One was chairman of General Electric and one was chairman of General Motors. This was "Engine Charlie."

We had approved the expansion of copper deposits, including White Pine, things that Kennecott could do to expand production. I sent the approval to OPM, but the contracts had to be let by the General Services Administration, which was run by Jess Larson. We had to work closely on these matters. He would assign some of his lawyers to work with our staff while we were negotiating with the companies, so that they would be well informed when approval came from OPM.

Expanding Aluminum Production

Boyd: This came about principally in the aluminum industry. Stuart Symington, later a senator from Missouri, was in the White House as a Director of Resources. He had been Assistant Secretary of War for Air, and he wanted to quadruple the production of aluminum.

We could not justify that order of magnitude from our contacts with the military, but could justify doubling it. I would meet in Jess Larson's office with the aluminum people and the copper people, after OPM had approved our recommendation.

Then one day Charles Wilson called me up and he said, "What's happened to the copper contracts?"

Boyd: I said they had been over in Jess Larson's office. I said, "It's a damn shame. We've been over there and these fellows were all in there from the beginning. They knew what the program was. All they had to do was write the damn contract and get it out. That's what we set it up to do."

Well, unfortunately Wilson used my words in talking to Jess Larson, and Jess got mad at me. He tried to get me fired. So it was getting to the point, I think, that this way of approaching the time problem, I had embarrassed the secretary. By this time it was Chapman. Krug had gone. He went off to Japan. While he was gone the undersecretary called me and began to shuffle papers back and forth.

I said, "You're firing me?"

"Well, if you want to call it that."

I said, "Well, I've never been fired."

But in the meantime, Larson had found that I was right and praised my actions in public by way of apology. I have never seen him since.

Swent: You were still director of the Bureau of Mines?

Boyd: I was still director of the Bureau of Mines. I was defense minerals administrator concurrently. Tom Miller did the running of the Bureau of Mines. We had offices very close together so any doubts he had he could walk across and we would settle right there. When one of my predecessors, Sears, was there, he had a deputy that had the door closed between them. He would go directly to the secretary, who wouldn't talk with the director of the bureau at all. But Miller and I had our doors wide open.

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Actually Tom Miller was a highly experienced, fine man. I wanted him to take my place when I was leaving, but he wouldn't do it. He didn't like the way I got treated. He had been there before I got there. He was the assistant director before I got there. He reported directly to me. We were and still are close friends. That left me free to do the interdepartmental work which should have been done by an assistant secretary, to be the defense minerals administrator. Then I had Jim Douglas to do much of the routine work. By this time I had two secretaries. One was my Bureau of Mines secretary who had been there since the second director way back in the early days, a wonderful woman.

Swent: You mentioned once that you had a secretary--I wonder if this is the one--who didn't know how to greet you. She would say, "Good morning, Colonel Doctor Dean Jim."

Boyd: No, that was the receptionist in the secretary of the interior's office. She sat outside the secretary's office. I would see her first and she would say, "Mr. Director Doctor Colonel Dean Jim." She would go through this rigamarole every time I would go in there.

Swent: Well, it is a problem. I've wondered when I write letters to you how I should address them, you've got so many titles.

Boyd: I don't use any of them. I prefer to be called "Mister." I never put the doctor on. I received three doctor's degrees, so I guess you could call me doctor.

Swent: Yes. You could select any of several distinguished titles here.

Boyd: That's putting on airs. You don't need that.

Synthetic Fuels; Benzene

Swent: So somebody called you in there and you felt you were being fired, and--

Boyd: This was the undersecretary. Let's go back to the synthetic fuels thing. We had worked up a plan, and Ferdinand Eberstadt, now back in New York running his financial office of Eberstadt & Co.--remember I worked with him during the war--he and his people had built a corporation to build a synthetic fuels plant which would make benzene, the chemical I've been talking about, out of coal. Well, that would have been quite an expensive plant and it looked at that time like the oil industry wasn't able to do it. While we were working this up the oil industry solved the problem. They began to produce benzene normally in the refineries.

I called Eberstadt and I told him, "You're not going to like this, but I don't think we should go ahead with this."

I told the secretary, I think we ought to not go ahead with that plant, because we don't need in wartime to be doing something unnecessary. Well, he had committed himself politically, I think, and this was the blow to something he had done to set up a synthetic fuels plant. I think that may have been the cause of my firing. There must have been other things I did.

Objection to Subsidizing Lead and Zinc

Boyd: Oh yes, I was also opposing the subsidization of the lead and zinc industry, creating unnecessary lead and zinc mines. I couldn't justify it any more. I was objecting to spending government money in wartime on expanding unrequired production. I think I made some enemies for that.

Swent: Where were the lead and zinc mines?

Boyd: Down in Missouri, New Mexico, Utah, all over the place. Some of them, of course, didn't need any such help.

Leaving Government Service

Swent: So you were snubbing a number of congressional--

Boyd: Districts, probably.

Swent: Who was president by now?

Boyd: Truman was still president. He was still president until I left there. But anyway, they fired me, see, from the Defense Minerals Administration. But of course they couldn't fire me from the directorship of the bureau, because Mr. Truman had appointed me and we had gone through holy hell to get confirmed. Everybody knew the president would have trouble with that.

I said, "You realize, of course, if you fire me from this job, then I have to resign from the bureau. If you haven't got any confidence in me to do that job, I better resign from the bureau." It was about time I did it anyway.

The Defense Minerals Administration was a direct appointment by the secretary of the interior. It didn't involve the presidential appointment, although he had to have presidential approval. I think they knew. Mr. Truman knew me well enough to know who I was and what we went through together. So I called the undersecretary on the phone later. I said, "I think I'm going to go off. I need a vacation. I'm not going to resign just yet."

So I took the family. I hadn't had a vacation in many months. I took them down to the south shore of Maryland. Then the Freeport Sulphur Company called me and asked me if I would come in and help them announce the establishment of the new sulfur deposit off the coast of Louisiana. I had had a battle with Congress because we were appearing to run out of sulfur, and sulfur is a very essential

Boyd: material in the chemical industry, particularly in wartime. They had two- and three-day hearings on the Hill about what we should do about forcing the industry to expand.

I stood up firmly and said, "No. The industry can solve these problems. They can't do it overnight, but they are aware as we are that we need more sulfur. They'll expand their plants."

They wanted me then, because I had done this, to be there to announce this plant. Then I told them I was resigning from the Bureau of Mines. They were about to offer me a job, but in the meantime I had been working with Charles Cox in Kennecott on some other things, and they had lost the executive vice president and the outgoing president and the incoming president in an airplane accident in Canada. A man, quickly caught, blew up the plane in which his wife was also riding.

So he [Cox] offered me a job. He said, "You can have one of three jobs, whichever you want." I took the exploration job that I thought I knew more about.

I went back to Washington and then said that I will resign. Mr. Cox wanted me the first of October. He had made up his mind that I was coming and he was short of executive personnel, and he wanted me in a hurry. I said to the undersecretary, "Let us wait until the secretary gets back before we announce this thing."

Then when Chapman got back I went in to see him. In the meantime they had drawn up a reorganization of the Defense Minerals Administration to appoint one of my assistants in the oil shale business who knew nothing about all this kind of stuff at all. A very bright scientist. Everything I had set up and done, it negated it. I put it before Oscar Chapman. I said, "Look, we worked this out together, we got the organization planning together, and I'm leaving. They want to do all this."

He said, "What do you want me to do with that?"

I said, "Well, tear it up." So he tore it up right there. I said, "Now I've got to tell you that I've got to resign because you essentially fired me as administrator, and I've got to go. You obviously haven't in the public eye got confidence in me, so I'm leaving." Of course, I wanted to leave anyway. It was a good excuse to get out of there. And Kennecott offered me a job. And I never really was out of a job.

Now we're coming into industry. I think that's about all.

Club Memberships

Swent: I thought you might mention here the clubs that you belonged to in Washington. Did you belong to them at this time?

Boyd: Well, I belonged to the Cosmos Club in Washington. I never had time to play golf. Later on when I retired and was going down there just to work, to be useful, my friends put me up at Burning Tree and I got in. I had to wait for three or four years. I had about five years left to belong to it.

Swent: Were you playing golf at all in these years, in the army, or--

Boyd: Well, yes, I was when I was with Kennecott. And with Copper Range I was playing in the Westchester Country Club.

Swent: But not now when you were in Washington with the bureau?

Boyd: No. I hadn't played golf since I was a child with my father in Australia. Oh, there was a golf club my parents belonged to when I was in college and we would occasionally go and play a game.

Swent: Did you ever play tennis? Australians are often good tennis players.

Boyd: Yes, I played tennis, but never competitively.

Swent: But swimming was your sport all through.

Boyd: Swimming was my principal sport.

Swent: Did you have any time for swimming during these years in Washington? I'm sure you weren't swimming in Germany.

Boyd: No, I didn't. Well, later when I left industry and went down there.

Swent: But not now. So Cosmos Club was your club?

Boyd: It's still my club.

Swent: Were you meeting people from industry and so on in that connection?

Boyd: Cosmos Club is primarily a scientific club. Not very many people from industry are there. Some, but it's really the gathering of the great brains in Washington from every walk of life.

Swent: How did you happen to join it? Who invited you to join?

Boyd: Well, first of all Bill Wrather, who was the director of the Geological Survey, was a member, and I think he put me up. Then George Harris, the photographer, was an old, old member of the Cosmos Club, and he got a hand in it. So I had lots of powerful friends. I'm sure I didn't have the technical or scientific qualifications—I had written some papers, so I apparently must have had enough to get in.

Swent: Well, you had said when you first went to Washington that you didn't know anybody.

Boyd: Yes. Well, that was during the war. By the time I went back the second time, of course I knew everybody.

Ruth Boyd's Activities

Swent: What about your wife? Did she have activities that we should mention?

Boyd: We didn't have any children for several years, five or six years before Brown came. We were married in 1932 and then Brown was born in 1937. So it was five years before the first child, and then Bruce was second.

Swent: She continued to teach school at that time?

Boyd: Then the two younger ones were born. Douglas in early 1942 and Hudson in late 1943.

But then when we moved to Connecticut the children were off to school, and Ruthie began to get to a point where I could see that she was missing the activities--actually we had help in the house. We had a gardener, we had a full time maid, and we had a lady who came in to clean who lived in the garden outside. Her husband did the gardening. She [Ruth] had loved that house. It was twenty-eight rooms.

Swent: This is when you went with Kennecott?

Boyd: No, when we went with Kennecott we got the house first up in Scarsdale. That was the house I had bought. I sold the house in Maryland and bought the house in Scarsdale. By this time we had four children. The house was big enough, and we had a live-in maid who lived in the back of the house, but then it became obvious that our parents were getting old. Then we realized that this house wasn't big enough. We looked around and Clemmie--Ruthie--both Clemmie and I mix up our previous families.

Swent: Yes, that's easy to do that.

Boyd: It doesn't bother either of us. So Ruthie went hunting all over the place and she found this lovely house in Greenwich. She adored it so we bought it and moved there.

Care for Parents

Boyd: Then her mother died, and her father had a stroke, so we moved him. We had a room on the second floor on the back of the house with [its] own bathroom and out from all the noise of the house. We bought him the first colored television set. The boys used to go up there and sit and watch the television with him. He had a wonderful time. He said he didn't know any old man that had a finer retirement. The only reason he retired from being a doctor was because he had a stroke and he didn't trust his judgment anymore.

Then my mother--

Swent: We haven't mentioned your family for years. They were in California all this time?

Boyd: All this time they lived in Hollywood. Dad managed the mines in Death Valley, and then when he retired they put him on as a consultant and paid him the rest of his life as a consultant. He did the work on other things, and he was free to do any other consultant work.

Swent: Didn't he also have a connection with the Mudd family?

Boyd: Yes, that's why. He had a consulting practice and Harvey Mudd had him working on the Cactus gold mine in the Mojave Desert.

Swent: But he was continuing with the--

Boyd: With the Borax Company, Pacific Coast Borax Company. He still remained one of the "twenty mules."

Swent: And your mother was still alive?

Boyd: Oh yes, she was alive. Dad had some sort of a thing that--he got uremic poisoning and he was in the hospital when the AIME was in Los Angeles. So I visited him and talked about his friends. Then I went back to talk to them in Denver and I mentioned this to Dr. Brown, and he said, "Well, you know that's terminal?"

I didn't know this, and Christian Science wouldn't admit it anyway. When I left, Mother said he gave up. He was in pain, and he passed on. He had looked forward to my coming and seeing him, so he went. Then Mother moved out of the house they lived in into an

Boyd: he went. Then Mother moved out of the house they lived in into an apartment on Wilshire Boulevard. There was a Christian Science practitioner. Their name was Rock. They used to be Rockefeller, but they dropped the feller. They kept [an] eye on her, but we decided she belonged with us, so it was one reason we bought this house in Greenwich. We wanted her back there with Dr. Brown. So she had a room on the first floor and he was in a room on the second floor. She had a heart problem. But she passed on a year after she came there.

Then the children were still coming home for holidays and so forth and bringing their friends, so we needed more than the little house in Scarsdale. That was a good investment anyway. We doubled our money when we sold it. We sold it for twice what we paid.

IX KENNECOTT CORPORATION, 1951-1960

Exploration Manager

Swent: Now we've gotten you up to being "fired" from the bureau and going with Kennecott.

Boyd: I went with Kennecott and my job was exploration manager. At that time we still had excess profits taxes, which meant that any failures we had in exploration, any money we spent on exploration when we wrote off the property could be deducted as a loss. So it was costing us about ten cents on the dollar to do exploration. So they were at me to do more of it. There was a vice president of Kennecott by the name of Anton Grey, who had been connected with the discovery of the copper mines in Africa. He had been in on that deal and he had also been working with his friends. He married an English girl. They had two children.

Swent: Where in Africa was this?

Boyd: Well, he was in what's now northern Rhodesia. What's the name of northern Rhodesia? Zimbabwe is southern Rhodesia.

Swent: Zaire?

Boyd: No, Zaire is the Belgian Congo. Zambia.

Swent: I get those countries mixed up too.

Julian Feiss, Assistant

Boyd: He knew that copper belt. My friend who came to help me in the bureau then came up—Julian Feiss—was down in that area as a geologist from Princeton, and went out to Arizona to get his master's degree in geology. He was in a campaign. He was looking

Boyd: for copper in Africa. He worked in the bush. Julian kept a diary at one time. He was out there with nothing, alone with a whole bunch of black men to carry his bags and so forth. Then he had to feed them off the land. He had to go off and shoot an animal every day or so. He described how it gradually became routine and he didn't want to keep track of it anymore. He came back to the United States. He came from a Cleveland family. Is this important?

Swent: Well, it's interesting, yes.

Boyd: He had a fantastic memory. He knew everybody in the industry. He had been editor of the Mining Congress Journal when I hired him away from there to come into the Bureau of Mines. When he came back from Africa he was home and he had a lady friend down the street and he had taken her out. They were within walking distance. They went to park his car in the family garage and they heard a noise upstairs in the chauffeur's apartment upstairs. It was a pretty wealthy family.

A stairway went up the side, and she begged him not to go up. But he did. He went up there and he couldn't find the light switch so he struck his lighter, and the room was full of gas. It blew up on him. He didn't realize she hadn't paid any attention to what he said to do, and she was following him right behind. He had to pick her up and carry her out of these flames, down those stairs. She died as a result of that, and he got his face burned, his ears burned off, and his nose burned, his lips burned, and his hands were burned.

He went into seclusion for a couple of years while they had twenty or thirty plastic surgical operations. He wouldn't go out to be seen by anybody. Finally he got over this and he realized this wasn't any way to live. He went back to geology and he went up to Climax. He was the chief geologist at Climax when I met him first.

I admit that the first time you see him it was quite a shock, but you soon forget it. I was never aware of it. When the war came along he had a commission in the army and they weren't going to let him in because of all his troubles. He asked the board of colonels to bring him in a typewriter and a forty-five automatic. He took that forty-five automatic apart, reassembled it, and put it out in front of him in thirty seconds. He took the typewriter and he could go just as fast as any secretary on the typewriter. So they let him in. They sent him back to Africa as a captain or a major, I forget which. He was in the intelligence service. He went into Ethiopia and worked with the natives and so on.

He had a fantastic memory. He was a very useful man to have around. But he had no administrative ability. I had him in my office, and he would be sure that my speeches were written correctly. I would go home and dictate a speech into a machine, and Miss Harvey, my secretary, would transcribe it, and Julian would

Boyd: take it around through the bureau to be sure that all the facts were right and the English was sound. Any resemblance between what I put into that machine and what came out of my mouth at the meeting were purely coincidental. That's how we worked my speeches. I was giving a speech, what, every week or so.

Swent: Then from the bureau did he follow you?

Boyd: He came up to Kennecott. Then when I left Kennecott to go to Copper Range--

Swent: But you were with Kennecott ten years?

Boyd: Nine, yes. He came up almost immediately and I had him doing this kind of work. When my successor took over my job at Kennecott he didn't know what to do with Julian. He just didn't know how to use him. So I called my friends. I knew he was unhappy there, so I called my friends in the Geological Survey. There was a new director by this time, and they were delighted. They would like to have Julian back, and so he went back to Washington until he retired and moved out to southern California. We used to write, put a postcard in the typewriter and tap out a message to each other. One time I noticed I hadn't heard from him for several weeks. Then I heard from Jim Richardson--do you know Jim?

Swent: Yes.

Boyd: Jim came to Copper Range as my personnel vice-president. He said, "You know, Julian's not very well and he's kind of feeling lonely without you. It may be terminal."

So I popped on an airplane and flew down to San Diego. I went and I spent two hours with him. Ann, his wife, says I was the last visitor he had, so I was fortunate. He stayed wide awake for two hours. He had been almost helpless for several weeks. He got a very bad back because riding around in jeeps over the African roads had been pretty rough on him. To me he was an invaluable assistant.

Swent: But you knew how to use him.

Boyd: I knew how to use him, and Harry Burgess didn't.

Vice President

Swent: Did you go to Kennecott as vice president?

Boyd: No. I went as an exploration manager. Then they began to see what I was doing was important and they advanced me to vice president in

Boyd: about two or three years, I guess. So I must have been vice president for five or six years.

Swent: And Kennecott at that point was broadening all over the world?

Boyd: I was trying to broaden it all over the world. The gold mines had come in. They were interested, and I had shown it to Anton Grey and brought them in. Then I had been there not more than two or--

Swent: These were gold mines in Africa?

Boyd: Tony Grey, knowing Africa. The man I went to work for, he was the vice president. I don't know what his title was, but he was a vice president. I, as exploration manager, worked under him. Then in about three years he quit and retired to England. He had most of his money in England. He had been paid for his African work in pounds, and he couldn't get them out. He had married an Englishwoman and he was really an English gentleman. His father was an English gentleman although Tony was born in Arizona. Very strange, I mean a wonderful character. He was a brilliant man, but a real curmudgeon. A lot of people, friends of mine I had met a lot of places, couldn't work with him at all, but we got along famously. He had confidence in what I did and backed me up.

But I was more aggressive than he was. He had one drill working out in Arizona someplace and he would watch every morning for a report on how this drill was. Before I had been there six or eight months we had twenty or thirty drills going on all over the place because the board were after us to do a lot more exploration. It wasn't costing them much.

District Organization

Boyd: What I did was to divide up the world into districts. I had five districts in the United States and I hired geologists to be district geologists.

Swent: So this was a total of six districts?

Boyd: No, no. This was in the U.S. alone. There were three in Canada on top of that.

Swent: Five in the United States?

Boyd: There was one in Central America, Georges Ordonez, and one in South America, Robert Ferron. Then we did some work in Africa besides, so we were all over the world. I had close to ninety geologists at one point. It was a big exploration group. But when I went in there, I

Boyd: said to Mr. Cox, "If I come, if you want me to be"--I said this to Anton Grey--"I must have charge of the exploration work and the geological work on the properties."

Well, they hesitated about that. I said, "Love me, love my dog, you know." That sort of thing. So they agreed. I wanted to be able to have an independent look at the operating properties. They were Bingham Canyon, Utah; Ray, Arizona; Chino Mines in New Mexico; McGill in Nevada; El Teniente in Chile; and Quebec Titanium in Canada.

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Swent: Did this bypass the managers?

Boyd: The answer is no. It didn't bypass the managers. The way we handled it was simply that these fellows, although they had to report to me, they were to act as guests, and although they weren't responsible to the general managers, they were responsible to me, they must get along with them, work with them, and become desirable citizens in the area.

The example for that was that one day the man I had in Bingham found out the way they were doing things and studying the geology and then laying out which part of the mine would go to the mill and which part would go to the dump. They were sending ore to the dump and rock to the mill. How were we going to change it?

I said, "Don't come to me and tell me about it. I'm going to forget you told me this thing. I would go to the vice president in charge of operations, and he goes down to the general manager and tells him. Where will you get? You're going to be an undesirable alien. What you do is go and buy him a drink, take him out to dinner. Talk about this thing and point out how you can help him, how geology can help them send the right rock to the right place."

Well, they made friends and they became indispensable. Then the next thing they did was they needed an airplane map so they could instantaneously find out what the pit looked like at any particular time.

Swent: This must have been very early in the use of aerial survey, wasn't it, for mining?

Boyd: I think so, probably. It wasn't new, because this man knew he had to have those airplane photographs. He had worked with them before. The war did a lot of this. This was well after the war. So we took the photographs. Then when you took those photographs they could bring an accurate map within a week of having flown it, or even, I think, sometimes a day or two. Then they took that to the people who

Boyd: were responsible to the survey. They didn't send it up to me, and I send it down. That meant the managers began to get confidence in us, and I got invited into the managerial discussions later on.

Swent: But at first they resented your taking the geologists out of their hands?

Boyd: I don't think Milliken ever did. He was a stickler for organization. It hurt his organizational power to have somebody working in an area who wasn't responsible to the guy that's on the property. It's an unusual thing, but this is the way you have to do geology. For instance, we got down to Latin America, to Chile, at El Teniente. I sent new geologists down there, two geologists, and they came back and they said, "They're bypassing ore, great masses of ore." There was millions of tons of two percent ore, which was high grade in those days, and they could lose it. They would be mining underneath and in their mining plan and would pass by that ore.

Then we had to maneuver that so that the general manager down there understood what was happening. Well, they got pretty angry because they had to change the whole mining plan. But they knew in their hearts that we were right about it. Nobody was really doing the geology in El Teniente from the time of Bateman--you've heard of Allen Bateman?

Swent: Yes.

Boyd: Allen did it, and Lindgren was down there. But that was years before. There had never been a geologist in the place to map it and study it thoroughly. They had to start with Lindgren and Bateman's work, but they did that, and they began to do the geology, and they were there to help guide the mining plans.

So, if I made a contribution to Kennecott, it was that; but it was organizational. I didn't do it myself. What did I know about the geology of El Teniente? What I knew about the geology is what these men came back and told me.

Swent: But you sent in the right people who did.

Boyd: Yes.

Swent: You had mentioned the man that you brought from Australia.

Boyd: Yes. I brought John Sullivan, and he brought with him Frank Joklik.

Swent: How is that spelled?

Boyd: [spells it, with strong Australian accent] That's how he pronounced it, with that broad Australian accent. It's gone now.

Left to Right: Frank Joklik, President, Kennecott; James Boyd; Clemence DeGraw Jandrey Boyd; Roderick Davey, Manager Mining Operations, Utah Copper. At the visitors' observation area of the Bingham Canyon Mine. August 1987.

Swent: He was Austrian?

Boyd: Yes. His father was Austrian and had offices in Australia when the war came along, the Second World War, and he was interned. Frank was born in Australia.

Swent: And Sullivan was Australian?

Boyd: Sullivan was Australian. He was high up in the Australian geological survey. When I got him here I put him in Canada. He sent Frank to see me while he still was in graduate school. He came in 1953 and I sent him to Canada. He cut his foot with an axe in the field, and while he was recuperating we sent him to--he couldn't be out in the field much--to the Harvard Business School. He was an international scholar sent over here. One of the senators had established a scholarship program.

Swent: Fulbright?

Boyd: Fulbright, yes, he was a Fulbright scholar. He got his doctor's degree over here. Later when I saw his reports coming in from Canada they were beautifully written. He really understood what he was seeing and did. I thought this is a waste of his time with a sore foot. We sent him off to Harvard Business School. Then when I was leaving Kennecott, Frank Milliken said, "What do I do with Jek?"

I said, "This is the best brains you've got in the company, Frank. You better send him out west and teach him how to run properties." He didn't do that immediately, but eventually he did. He did send him out to the properties.

But about that time AMAX came back at him and wanted him to go back to Australia to straighten out their iron ore problem back there. Then at that time I wanted him to come with me to Copper Range and he would have been president of Copper Range later. Maybe we wouldn't have ever let it go the way we did.

But he was falling in love with a very beautiful airplane hostess, Pam, Pamela. She didn't want to settle down yet. If he came with me then he would have to go up to White Pine and be out in the bush, and she had been too used to traveling around. So they were married, then he went with AMAX. With this Australian problem, then he would be traveling all the time, so he came back to Kennecott. They put him out in Bingham, in Utah. He's now president of the Kennecott subsidiary of Standard Oil of Ohio, which is now part of British Petroleum. Clemmie and I had dinner with him in Las Vegas on Sunday night. They came for me with a long black limousine. We had a very wonderful time together.

Boyd: Well, another one of our geologists was a Frenchman. I went down to the schools, among them Stanford. I talked to Charles Park out there. I picked three or four people I brought into Kennecott from their graduate school. One of them was a Frenchman who had to go back and serve his time in the French army. I hired him and let him go to do some work in North Africa. Then he came back and I sent him out to try and give him a chance to try out. He came back. He went with Harry Burgess, the fellow who succeeded me as vice president when I left Kennecott. Now dead. Harry was a Harvard summa cum laude graduate. I had met him first in Washington--he worked in the Marshall Plan operation. I had worked with him so I knew him quite well. Then I gladly hired him because he was a fine geologist, basically. He would look down his nose at me, a trade school boy from Cal Tech. I put him in charge of the central United States. He had his office in Minneapolis.

I went up to visit him one time and he said, "I'm going to take you out to Charlie's Hamburger Heaven." Well, Charlie's Hamburger Heaven was about the finest restaurant that side of the Mississippi River. We had a big round table, with a lazy susan in the middle. They spun this around and they said to me--the head waiter was over behind my shoulder--"I bet you can't tell me what that is."

So I took this thing and I bit on it, and I looked up in the air very wisely. I said, "That's a Jerusalem artichoke."

Their mouths dropped open. "How do you know?"

I said, "Harry, I've been around." My mother used to have what we called root artichokes, but we call them Jerusalem artichokes, and my mother used to give us them with cream sauce in England. I remembered that flavor, that taste, all those years. Then I think he changed his opinion. He thought maybe I knew something.

Swent: And he was the one who succeeded you at Kennecott?

Boyd: Yes. He's now passed on.

Swent: You mentioned that you brought somebody who was French, and I don't think I got that name.

Boyd: That came out of the French army. I sent him to Harry Burgess, his office. He began to work in the central United States. Later on when I brought Harry to New York this man--he pronounced his name in French, and then he anglicized it. [Paul Bailly] He became the president of Occidental Minerals, minerals operation under the fellow that's the famous president of Occidental.

Swent: Armand Hammer?

Boyd: Armand Hammer. He got tired of working for Armand Hammer, so now he's got his own company in Denver.

When I went to see Cox I had tried to see him for two or three days. He only had two vice presidents, Frank Milliken and myself, and I wanted to see him and I sometimes wouldn't see him for two days.

So he sent for me and he was coming into his office, and he was taking some soda or things like this; he must have had heartburn. "Want to see me?"

I said, "Yes, sir."

"What do you want to talk to me about?"

I said, "Well, I have been offered and accepted the presidency of the Copper Range Company."

"Who are you going to take with you?"

"I hadn't thought about taking anybody with me, but I might like to take my secretary." That's how I left Kennecott. But from there on he never asked me to come to his office. He came down to see me. I was now on a level with him, you see. He had been in the steel industry, had been president of one of the subsidiaries of U.S. Steel.

Swent: But you worked under him, with him for a long time?

Boyd: I worked under him for nine years. Well, it got to the point that everything I tried to do he scotched. For instance, I came up from the Bureau of Mines. I had all this information at my fingertips about what minerals were needed and what their future was, where they came from, and what needed to be expanded. I wrote him a report and I said, "This is what we ought to be doing if I'm going to be the exploration manager. These are the minerals we want to go out and find, and we can expand it away from copper, broaden out. He took that report which I worked on for weeks, put it in a file, and never even acknowledged that he received it. Anton Grey must have read it for he sent a general letter before he left.

Bit by bit I began to get it. I got some mines in Nigeria and we did work. I opened up the stuff in South America and Alaska, and then got into Canada. Then every time I wanted to get anything done, he scotched it. I was in Greece, the only deposit of asbestos in Europe. We discovered that. That wasn't due to geological discoveries. It was due to our relationships with people that we were working with. He scotched that.

Boyd: So then when they came and sent the body snatchers out to offer me the job at Copper Range, I said to Ruth, "They're offering me this change."

She said, "Well, I don't know anything about the new job, Jimmy, but I know this, that you can't stay where you are. It's killing you, destroying you." I didn't realize this, what it was doing. She was bearing the brunt of it, I guess. So I accepted it.

Actually, I suppose that I did better financially, and certainly it was much more fun running a company of my own than it was being under this kind of management--and Milliken wouldn't have been any better, because Milliken was ten years younger than I was, and it was obvious that he was the heir presumptive, that he was going to be the president.

Swent: He was the other vice president?

Boyd: He was the other vice president. He had charge of the mines and I had charge of the exploration. Then we had a research director who really was a vice president, too. But that's all. That great big corporation.

There was a woman there that when the Guggenheims set up Kennecott, at the beginning she was the only secretary in the place. She kept the files, she wrote all the letters. When I got there she was about to retire, and she was a file clerk. But she had six file clerks under her. In the early days, she did all the books, too. The accounting department came along and they had a whole floor in our building, in the Chrysler Building.

Swent: How things have changed.

Boyd: Yes. In each of the mines they had a whole building that had the IBM 630 computer that poured out figures which they used to send me. I didn't know what to do with them. They didn't mean anything.

Swent: So there were five people who went with you, you said, when you left Kennecott.

Boyd: No, who wanted to come.

Swent: Who wanted to come?

Boyd: Yes. I took my only secretary and the research director. I had him quit first, then when he quit later on I picked him up.

Swent: But there were others who--

Boyd: Who had come in to talk to me, yes.

Swent: That was a credit to you.

Boyd: Well, I took some people from the Bureau of Mines, too. When they saw the way I was treated in the Bureau of Mines. Besides Feiss, there was another man, Lowell Moon, that I made one of the regional exploration directors in Kennecott. In fact, I would prefer to have him be my successor, but Cox picked Harry Burgess.

X COPPER RANGE COMPANY, 1960-1971

Deciding to Go with Copper Range as President

[Date of Interview: November 8, 1986] ##

Boyd: Well, I had no plans to leave Kennecott at all. It never occurred to me. Early in 1960 an executive recruiting service came to me and wanted me to consider the presidency of the Copper Range Company.

Swent: This was in New York City?

Boyd: No, in Boston. I had described the process by which the government had helped me get the company started with its new ore body at White Pine and put it into production. This was in the late 1940s. I was aware of the technical and financial difficulties we had to face when deciding it was in the public interest to put that mine into production. That's all described in this book of the Newcomen Society on the Copper Range. When they came and asked me to do it, I thought that this was a tough job, even though we thought it was a mine that could be put into production for the war effort. This was during the Korean War. It didn't occur to me that it would be a viable financial operation.

Ira Joralemon Reports on the Ore

Swent: So you knew what you were getting into?

Boyd: Not all entirely [laughs]. But Ira Joralemon, who you know about--

Swent: Oh, yes.

Boyd: --was a distinguished geologist and a member of the Copper Range board. He came to see me and showed me the reports of a discovery of a high grade ore body that covered a vast area. No doubt it is still there.

Swent: Where exactly is it?

Boyd: It's south of Houghton, Michigan, inland from the shore of Lake Superior about ninety miles. There was a town called Ontenagen that's just in between. The town now is the incorporated town of White Pine, which was a mining camp when I got there.

Swent: And the ore body is different from some of the other Michigan ore bodies, isn't it?

Boyd: Well the main Michigan, what caused the mining of copper, was the vein deposits of native copper. It was mined in sheets of copper. In fact, it was very difficult to mine because sheets of copper metal can't be blasted. It just bends. You really had to mine around it and take out these big hunks of metal. It was sometimes expensive to mine for that reason. But the White Pine ore body, it goes back to Pre-Cambrian days, and it was laid down in shales. The minerals there were largely chalcocite, which is a high grade copper mineral, with a certain amount of native silver and native copper. It's therefore bedded, laid down in beds, and has to be mined somewhat like coal. The mining is mainly a seam among the bedded deposits in there, so it was a more difficult job than normal mining. The big open pit mines out of the porphyry coppers are mined with large shovels at the surface. The only underground mine of any importance in the southwest is down in Arizona, the one that Newmont has--at Magna, Arizona. That's an underground operation.

Swent: So when was it that Ira Joralemon came to talk to you?

Boyd: That would have been in the early months of 1960. I went to work for Kennecott in August of 1951, and I left it in June of 1960. So I was with them for nine years.

It's like the oil companies going into copper. I never understood why they would do that because the biggest mines in copper wouldn't be a touch on their income from oil, the way it used to be. It's not any more. They found that out, now, ever since they took over Anaconda. Atlantic Richfield took over Anaconda, and Standard of Ohio took over Kennecott, and so on. But Phelps Dodge never got taken over. The big oil companies that did take over some copper operations have either sold them off or put them in standby. Kennecott, inside British Petroleum, is modernizing Bingham Canyon and has sold the mines at Ray, Arizona; Chino, New Mexico; and McGill, Nevada.

The only thing we ever started from all the things we discovered in our exploration department was the lead-zinc mine down in Missouri, which as far as I know is still running. We found phosphates in North Carolina, and that eventually went over to somebody else. We never went ahead and did anything with it. We should have been into the gold fields that Copper Range got into later on when I was president. I'm getting ahead of myself here.

Swent: Okay.

Boyd: So then I began to think about it a little bit and I began to realize this was important. Jeralemon had now convinced me that there was a place there. It wasn't going so well for me in Kennecott, so I felt that it was about time that I got out. I went right ahead and negotiated the contract with the acting president of Copper Range, who was a partner in the big financial firm Paine, Webber, Jackson, and Curtis. He was married to one of the daughters of one of the original founders of Copper Range Company. His name was Nelson Darling. I negotiated with him, and I went up to Boston and met with the board. They accepted my terms, which were fairly moderate, I guess. I was by this time fifty-five years of age, so I had only ten years to go. They couldn't put me into their regular retirement fund, so they had to write me a contract. I've still been supported by that contract even though it has been sold out to somebody else.

Moving the Office to New York

Swent: The headquarters, the office, was still in Boston?

Boyd: Still in Boston. By this time it was the last mining company left in Boston. The rest of them had moved into other places, mainly New York, and it was quite obvious to me that it was no place for me to operate from. I said to the board, "I come with you on the condition that I move the office to New York, where I can work with the rest of the industry." They agreed to that, too.

Swent: I know that Calumet and Hecla Company was in Boston because of the Louis Agassiz connection.

Boyd: That was the original source of funds for the copper industry in the United States, but it gradually moved into New York, or out to San Francisco and places like that, so that there wasn't anybody else. You just didn't have a mining community in Boston. There was a small office in Boston. Somebody from Calumet had to be there occasionally, but it wasn't an office to work in.

Swent: So this is really the last--

Boyd: It was the last of the copper companies in Boston. So within about a year's time I had arranged for space in Rockefeller Center and I moved the headquarters down there.

Jean Arre, Secretary

Swent: You did take somebody with you?

Boyd: My secretary. Well, she didn't come with me until I moved the office to New York. Then I had a secretary who had been in Boston right along. She didn't want to move to New York either, so it fitted nicely to bring Jean into--

Swent: What was Jean's last name?

Boyd: Her name was Jean Arre. She had been my secretary from the time I came to Kennecott. We were very close. She ended up by being the assistant secretary of Copper Range when I left. She was with me for twenty years.

Swent: Another example of your skill at using people well.

Boyd: She was a wonderful person. She was a blue-nose. She had the widest grasp of the English language, and I never let anything go out of that office that Jean wasn't the last to see it. Printing or proofreading, or anything like that. I used to say, "Well now, why don't you write this letter for me?"

"Mr. Boyd," she said, "I can get the English correct, but I can't create letters." That's the way she put it.

I couldn't just say to her, "You write John Jones and tell him to go to hell." I had to dictate it to her, but nevertheless, she would catch it. I don't know of anything that ever got out of that company that wasn't letter perfect, our annual reports and things like that. It doesn't even happen in books today.

Swent: No. So then it didn't mean moving your house again?

Boyd: No. That wasn't a reason I didn't go, but we had this very big house in Greenwich, and Ruth, this was her house and she thoroughly enjoyed being there. We had been there for some years before my leaving Kennecott.

Ruth Boyd, President of Woman's Auxiliary, American Institute of Mining, Metallurgical, and Petroleum Engineers

Swent: Was Ruth active in the Woman's Auxiliary of the AIME at that time?

Boyd: Yes. She was a member of the Woman's Auxiliary from the time we were in Denver before the war. My mother talked her into doing that, so she had always been active in going to the meetings and so

Boyd: forth. She knew how to operate it, and when it came time they elected her president, and they kept her on, so obviously she did a pretty good job.

I remember once going down to St. Louis to give a talk to the AIME, and she went down at the same time. She had to give a speech first. I had never heard her talk before. My hands were moist and I was nervous as a wet hen. She got up there and in that charming way of hers she told interesting stories and got a little amusing. She kept it very short and it was a wonderful speech. I had to follow that act. It wasn't so easy.

That's how she then became president. They wanted to keep her on for another year, but she wasn't feeling well enough. She was in Washington by this time, and her strength was beginning to fade, I think. And I think the trauma of moving from that house in Greenwich down to Washington had some effect on her. In fact, it was six months there that I don't think she was very happy with me. I didn't quite realize; she never let me know. But then she began to enjoy Watergate, and I was elected to the Academy of Engineering, and she held a tea party there for the ladies visiting, which she couldn't do today, because it's a much bigger organization than it was then. She got to be quite active in that operation and the DAR.

Challenges at Copper Range

Need for Experienced Mining Personnel

Boyd: Well, we've gone off there. Now I'm going back to Copper Range. The problem with Copper Range is that they were almost totally--not totally, but far too short of people experienced in the mining industry to operate. Maurice LeCroix, who had been president at the time that we had negotiated the deal with him--when I say "we" it was the federal government, and I was the agent of the federal government then--picked up this arrangement. He was the president, and he brought it down and we negotiated with him. The contracts were signed by the General Services Administration, but we in the Defense Minerals Adminstration had to negotiate the deal.

They had another young man who was the son of the very finest mining engineer, too, who was president for a while, but he just didn't make it out. They replaced him by Maurice LeCroix, who died. They replaced him by the man who ran the Hussey operation [Hussey Metals Division of Copper Range], which were the fabricating facilities in Pittsburgh. He had no experience in mining at all, and of course he was trying to get this operation at White Pine going, and it needed mining engineers. It needed people who understood mining.

Boyd: In the meantime, they made Pete Lally, who was the president of Hussey, the president of Copper Range. Apparently they felt that he just didn't have the experience to be able to handle that operation, so they went looking.

Swent: One of the current management theories, I understand, is that management is management, and it doesn't matter whether you're managing a mine, or a fabricating plant, or a shoe store.

Boyd: I think that's the problem of American industry.

Swent: If you have a few courses in management at Harvard that you can manage anything?

Boyd: That's what they think. My second son, Bruce, is an M.B.A.

Swent: That's supposed to open the doors to anything.

Boyd: That's supposed to. And I think he's well trained in business, but nevertheless, those companies that are run by--the mining industry began to be run by lawyers after a while. There were a lot of lawyers, people like Monroe from Phelps Dodge was a lawyer. It's true he was an honor graduate, a Rhodes scholar, and he was a professional basketball player, too. He is now retired.

Nevertheless, you had to have mining men around you. I think this was Mr. Cox's problem. He had been president of one of the subsidiaries of U.S. Steel. His knowledge of the way you handle the technology of copper was entirely different than the way you handled steel. And the marketing system is entirely different. I think it was hard for Lally to do it, and he didn't have the kind of people he needed in Copper Range to help him with it.

I recognized that as soon as I got to be the president. The sales manager was a man who was put in by Pete Lally. They were great friends and he resented my coming in. I had a hard time getting him around, but we ended up being close friends. He was a very good sales manager. He knew the consumption industry very thoroughly. He had made friends throughout the industry. So we always got our share of the market the ten or eleven years I was running the company.

Swent: Had you gone to Michigan and visited the mine at the time you took over?

Boyd: No. But I had had all the maps, the geology, and I had studied all that, and I had studied the history. Of course, I had studied a lot of it before this happened. I remember when we were getting out this contract I had five mining engineers go up there and go over it, and three of them voted against it and two were for it, and I had to overrule them. Jim Douglas was my assistant director of the

Boyd: Defense Minerals Administration at the time. That's Lewis Douglas's brother. He came from Arizona. Between the two of us we decided that we needed the copper bad enough, and this was the one place we could get it better than anywhere else quickly, so we approved the contract. Not because we thought it was a good financial deal for the stockholders, but because the country needed the copper, or might need it if the Korean War broke into a more widespread war. We didn't know whether that was going to spread out to be another major third world war. So we had to be prepared to get copper flowing again.

Swent: So it was at the Korean time that they borrowed this money?

Boyd: Yes. The White Pine mine was expanded in answer to the question of copper supply for the Korean War.

Swent: And they got the money from the RFC?

Boyd: They got money from RFC, and they got everything we could do to give them help, which was a rapid amortization. When I came in there, one of the first things I did was to finance it privately, pay off RFC and have it financed by the New York Life Insurance Company. Sixty-five million dollars we borrowed.

Swent: And that was one of the things that you instituted?

Boyd: Paying the debt off, yes. Well, I got some encouragement from RFC. They wanted to get out of business, too. It was the obvious thing to do, and I had to negotiate with the New York Life.

Labor Troubles

Swent: Had they been having labor troubles at that time when you became president?

Boyd: Oh yes. We had United Steelworkers. They shut us down for eight months, you know. The copper industry was shut down for nine months. I settled a month early. The trouble was the man we had to deal with up there just simply didn't know how to come to a conclusion. I finally went down to meet the president of--

Swent: You mean the union leader?

Boyd: The union leader. He was a Finlander, trained in Moscow. I tried to make friends with him and to get him to understand what the problems were. I didn't want to interfere with the people on the job. So I went down to talk with the president of the steel workers, I. W. Abel, and we became good friends. He later became

Boyd: the ambassador to the United Nations. He was responsible for keeping the steel industry out of strikes for years. He made the contracts that permitted that to happen.

He told me the difficulty was they didn't have enough money to train people to do the negotiating. He couldn't do it himself, and they'd insist on doing the whole copper industry at once. Rather than dealing with one particular operation or mine which had different problems than others, they wanted to contract for the whole industry the way they tried to do it for steel.

So these long strikes--well, I had then planned to go out and get into aluminum. I had an arrangement with a company, one of my customers, that we would put together a plant. They would run an aluminum plant, or a fabricating plant for aluminum, and we would come in. But this strike just cleared me out of any surplus capital to do it. So we couldn't take that.

Swent: This was an industry-wide strike then?

Boyd: Yes.

Swent: Arizona, Montana--

Boyd: Yes, the whole thing. Arizona, Montana, Utah, everything. We were down for almost nine months, eight or nine. I've forgotten now exactly the length.

What I'm talking about is the competence in the industry. Obviously the board had recognized this. One of the members of the board was a Paine. He was the son of the original W. A. Paine. He was a stockbroker. He didn't really know much about White Pine or the mining operations. There was a geologist on the board who was very useful.

Swent: Was Ira [Jeralemon] still on the board?

Boyd: Yes, Ira was on the board. I can't remember when he got off. He got off for some reason. [moves around] No, he was off before this picture was taken. And there was another Paine [who] came on the board, a younger man, Ward Paine. That was the board later on, near the end of my term. [shows picture]

Managing the Forest Preserves

Boyd: Now, the manager of the mine itself up there, who Mr. Lally had put in there, was a man, William Nicholls, who had been with the Copper Range for years, almost all his life. He was the land man. They

Boyd: had large forest preserves that they had taken up in order to have the mineral rights as well as some holding of the land—we had five foresters in there selling the trees on the stump and managing the forest.

Swent: And they were exploiting this forest at that time?

Boyd: I would not call this exploiting. Trees mature and die and they have to be replaced. Harvesting mature trees. Later on in my day, Nicholls and I decided we would go into the saw milling business, and we set up a mill to take the lumber coming out of our forests and cut it up to the specifications of the furniture manufacturers. So you didn't have to ship them logs. We shipped them pieces of wood that were cut to the right size for the chairs and whatever else they were making, the furniture they were manufacturing. It was called a dimension plant.

Swent: Which of course they would pay more for.

Boyd: Yes, but it was cheaper delivered in this form; freight costs were reduced. We took all that sawdust made up in doing this and sold it to a pulp mill that made paper out of it.

Improving the Staff

Swent: But no one had thought of doing this before you got there?

Boyd: No, I think it was a standard thing, but it hadn't been done up there. So we built this plant. The Louisiana Land [Company] later sold it off. William Nicholls was this man who was also running the White Pine Mine, and he simply hadn't any knowledge. For instance, the safety engineer was a bus driver when I got there. He had no more idea about what made operations safe than a bus driver. He hadn't got the concept that safety in a mine is one of the most important things to assure.

Then there were only two mining engineers in this great big mine, one of the most difficult mining operations in the world. There was a metallurgist in the smelter. There was a mill man, a graduate engineer in the mill. That was the substance of the staff. We needed a foreman--or at least an assistant manager--on each of the shifts in the various parts of the mine. And we needed a mechanical engineer to maintain and improve the massive equipment needed to break and transport the rock.

For instance, when I got there, I think something like 50 or 55 percent of the mining machines were down for lack of maintenance. There was not a mechanical engineer in the place to maintain the

Boyd: equipment. There was no regular system of taking machines out of operation for preventive maintenance. Then I got a hold of Jim Richardson. Have you ever met Jim?

Swent: Yes.

Boyd: He was with a company in San Francisco at the time. I got him to help me recruit. He came in to be with me in the Defense Minerals Administration. James K. Richardson. He used to work for Kennecott. He was an assistant superintendent at Chino. You must know him. He knows everybody.

Anyway, I said the first thing I needed was a safety engineer. He found me an ideal man, a little fellow. Immediately I said to Larry Garfield, who was the mine manager, "This man reports to you, not to anyone else. I mean anything he sees wrong with safety, he has access to me if necessary. He's got total authority. He's got my authority to do what is essential."

This man turned out very well, and our safety record went from one of the worst in the mining industry to one of the top.

Swent: Yes, one year you got a big award for safety.

Boyd: Soon after we began, actually. The first year I got there we had five fatalities. This was the ex-director of the Bureau of Mines having five fatalities. That was not good. So that was the first thing I got after.

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The next thing, we needed a manager to replace William Nicholls to run the whole operation, business, labor, and everything else. The man Richardson found for us was Rick Cole, a very fine man. When we found the man we wanted and he agreed to come, I called Bill Nicholls in and I said, "You know, I'm going to have to relieve you."

He said, "Well, I've been expecting it." He was fully prepared to return to the management of the lands, the lumber, the railroad, and so on.

Then I sent him back to where he lived in his home in Houghton, and he ran the land, and he ran the Painesdale operation, which is also a small copper operation out there. We had to get him a manager for that one, so that he had a man who later turned out to be the general manager at Newmont's operation which we mentioned.

Swent: Warren Parks, at Magma.

Boyd: Magma. All these fellows did very well that came out of Copper Range. They still do. So we had some very good people.

Well, the first year we had a serious loss because we took all these machines out and we started repairing them and putting them in shape. The management was getting better. All these things were going along. But everybody would walk across the street when they saw me coming so they wouldn't have to talk to me.

The Rand Medal

Swent: Out there?

Boyd: No, that was in New York. Within two years we were showing a good profit. That's when they gave me that gold medal.

Swent: The Rand medal?

Boyd: Yes. I didn't do anything except to get people to work. Of course, I do know enough about mining so I could see the right thing, argue with them, and press them to do the right thing.

Research in Mining and Rock Mechanics

Boyd: I made some mistakes, too. I'll tell you about that. So I think the first thing I did was to staff it. Then I realized that we had one of the most difficult mining operations in the world, and we needed to find new methods of mining and of handling the ore. So I got the general manager up there to set up three research divisions, one on the metallurgy, one on the mining methods, including rock breaking, transportation methods. We did a lot of experimental work. We even experimented with longwall mining.

Then we hired rock mechanics specialists. We took on a consultant, a fellow by the name of Jim Scott. He was a professor at Rolla School of Mines in Missouri. He was one of the first broad scale rock mechanics students. His predecessors had recognized that we weren't going to run that mine by setting it up. It's an underground mine run like a coal mine, and the roof bolts had come in about the time this mine was opened, so those people who developed that mine developed it with the use of the rock bolts. That was done before I got there. The use of roof bolts, however, was introduced by the Bureau of Mines during my directorship.

Boyd: But then there was the question about how long should we leave these openings open, how much of the ore should we mine, how much should be left in pillars. We decided to cave parts of the mine. From there on we set up a rock mechanics group of people who have turned out very well in the field. I think that was about the first time such a group was established to guide plans in mining. Where you went and how you mined it was the result of the solutions to problems by the rock mechanics research group. As far as I know, it was the first time a mine had been operated with that kind of guidance. These people could even go in and tell the men that this particular part of the mine would collapse at such and such a time, the day, and what time of day.

In the early days when they would say that, the men would be gone a thousand feet down the drift. Then five hundred feet, then a hundred feet. Pretty soon they kept on working. The rocks were all around their feet, and they knew and had confidence in these engineers who could tell them by keeping track of the roof bolts and the pressures and the things like this. They could predict.

Swent: This research group was made up of engineers?

Boyd: These were engineers who were trained in rock mechanics or mining engineers who understood rock mechanics.

Swent: And they reported directly to the manager?

Boyd: They talked to the manager of the mine, yes, but it was the general manager, Rick Cole, who was head of the operations in White Pine. The research group reported to him.

How to Be an Executive

General Clay's Training

Swent: Was this the sort of thing you had learned from General Clay?

Boyd: No. He might have learned it from me if he ever had anything to do with it. [laughs] No, what I learned from General Clay is how to be an executive. How you got other people to do the things and knew who to go to, to do it, and then to judge whether they're being successful or not. I told you the experience of my being asked to get the coal mining machinery over to England.

What do I do, go and try to do this myself? I didn't have any authority. I didn't have anything to do. I went to the Corps of Engineers and worked it out with them, and they're the ones that did

Boyd: the work. The same way you do any administrative work. You find out what the problem is that you need to solve. You find out how it is going to be solved and who is going to solve it, and then you get out of the way and let them do it. No sense standing around. But too many managers are going to keep the decisions in their own hand.

My people used to say to me, "Now what is it you want?"

I said, "Look, I've given you a responsibility. You're the man responsible in this company for that particular activity. You tell me what's best for the company, not what I want. That's what I pay you for." Amazingly few people know how to do that.

I think Clay taught me about that. He used to say to me, "If you issue an order," down to all these agencies that worked under General Clay's direction, "you go down and you talk out that order with who's going to receive it before you issue it. You don't go down and issue orders without them having a hand in seeing that that was the kind of order that would produce the result you want produced." Now that's the kind of thing that Clay would have taught me. It sounds simple now, but it took a while to get that through my thick skull. [laughs] It may not be the way the business schools teach management methods.

Swent: And that's the kind of thing you were doing at White Pine?

Boyd: Wherever you are after that. When I was in Germany running a very large operation for the re-establishment of German industry I had to depend entirely on--for instance, this man up here, [points to picture] Walker Cisler, had charge of the electrical industry, of the power industry. I had to know certain things that needed to be done, but he would come in and tell me what he was doing and so forth, and I would ask him about it. Then he said, "Well, what do we do?"

I would say, "Well, we go and do it right now." By the time anyone turned around, he and his western European associates had all the power systems in western Europe interconnected. You might never have been able to do this in peacetime. The politicians would never let you do it. They would argue about it forever. By the time the governments had reformed, their power structure was all worked out for them, and Walker did that. So he has a Croix de Guerre and everything else. He's got all kinds of medals. It was Walker that did it, not me, yet it was our division that did it.

Swent: Did you find, though, that when you got into industry or government, either one, after the army, that it wasn't quite so easy to get things done?

Boyd: Oh no, it's easier.

Swent: Is it?

Boyd: Yes, I think so. I think one of the greatest shocks to me really was when I went from the Bureau of Mines and the Defense Minerals Administration to Kennecott. They gave me the job of being the exploration manager, and I had to do certain things. I would say, "Where's the money coming from?"

I would go down and talk to the controller and he would just look at me. He said, "You're an officer of this company. You're authorized to commit the copper company funds within your jurisdiction."

It was hard for me to realize that I didn't have to go to Congress to get appropriations, and stay within the appropriation and so forth.

Relations with the Board of Directors

Boyd: I would get budgets, and I would have to stay within the budget. Every year I'd go before the board to do it. The same way with the Copper Range. If I had any major thing to do to take on, I would take it up at the next board meeting. I had to be prepared, and they would be prepared to answer my questions from a business point of view, but they wouldn't gainsay my judgments of the engineering aspects of it, or the economic aspects, for that matter.

The board, however, did insist that I have a financial vice president, as I had little experience in corporate financial matters. A financial man that got recommended to me by a vice president of Chase Bank, William Butler, who was later chairman of the board. He was my contact vice president in Rockefeller Center. I talked with him about it. He brought Charles Nielsen.

They gave me stock options, and at one point I wanted to take up these stock options. To do that I had to borrow $100,000. I thought I had to go through all kinds of rigamarole. I called up Bill Butler and I said, "Bill,--"

He said, "When do you want it?"

I said, "Well, any time you can send it."

"I'll have a check over for you in half an hour." A check for $100,000!

I said, "How about collateral?"

Boyd: He said, "When you get your stock, turn them over to us. We'll keep them in the bank for you."

That's trust. The bankers knew me, they knew what my reputation was. They knew that I wouldn't be doing anything crooked, and I wouldn't be coming to them unless I had a good sound financial reason to do it.

When I went to the insurance companies to get the $65,000,000 to pay off the bank, they investigated it of course, but they had complete confidence in what we would do. It didn't take us very long to raise $65,000,000. It seemed easy. You're talking a lot of money. Even today it sounds like a lot of money. It was in those days a real lot.

Swent: I was wondering if you wanted to say anything about your board, since you're talking about the board now. Did you have any input on selecting your board members, for instance?

Boyd: Yes, but it didn't change much all the time I was there.

Swent: And there was nobody on the board with mining [experience]?

Boyd: Well, Ira Jeralemon was on the board.

Swent: He was a geologist.

Boyd: And there was another younger man who was a geologist.

Swent: Both geologists then? No mining?

Boyd: No. There were no mining men. No, they were extraordinarily lacking in mining experience. Nelson Darling, then a vice president of Paine Webber, had been running the company while they were searching for me. He remained on the board as chairman of the executive committee. He had been on the board for some years, so he was not without knowledge.

Swent: But there were no mining men even on the board?

Boyd: On the board and only one at the operating level. I can't give you the exact figures, but we went from three or four engineers in the mining operation up to thirty or thirty-five before we got through. They were doing research to improve mining methods and getting your cost down and so forth.

Swent: So your board had to rely completely on your judgment in anything to do with mining.

Boyd: As a whole, yes. They were very good about it. I don't think they ever said no to anything I asked them to do. I hoped I wouldn't go to them unless I had worked it out right. There were a lot of things that went wrong, but they never gainsaid me. They would ask some questions, pretty tough ones to answer sometimes.

Well, let's take a look at these people. What did I do with that picture? Here it is.

Swent: You said there was a Paine.

Boyd: Yes. That was the older member of the Paine family, Stephen Paine. This is the younger one that came in later, Ward Paine. This is near the end. This was the chairman of the board of General Telephone, Donald Power. But he's primarily a lawyer. This is an oil executive, Hadley Case. He had a lot of stock in the company. I went on the board of his oil company later on. This was a lawyer, Ernest Sargeant. Later on I got to know the dean for Harvard Law School, and he had been the solicitor general of the United States. He told me this was the smartest student he ever had when he was at law school up there.

This was the president, the owner of the New Mexican newspaper in Santa Fe, Robert McKinney. This is the man who was running the company and hired me. He's a top senior member of Paine, Webber, and Jackson. That's Darling, Nelson Darling. This is president of the Scott Paper Company, George Olmsted, which later merged onto another one. Here's a geologist, John Rand. Here's Peter Lally, who had been running the company before Darling, and he was still on the board at this point. And here's the man who succeeded me as the president when I left, when I retired. Chester Ensign. Chet was a geologist, too. But the rest of these were businessmen.

Swent: And lawyers.

Boyd: And lawyers. Ernest Sargeant was and is a very top businessman. I went and stayed with them in their house the year before I married Clemmie. You were asking about the board.

As a fact, I could go to the board and I never went home on Friday unless I called Nelson up to tell him what was cooking. This man, Chet Ensign his name was, that followed me, he got in trouble with the board because he never told them what he was doing. Nelson would be the one that would pass the word on to other members of the board he thought needed to know about them, but I never went home on a Friday night that I didn't call Nel up and tell him what I had done or what was going on, and what things were going to happen. That relationship with the board was absolutely essential. I don't know how you would manage without that relationship. Much of the troubles you see with companies, the management and the board get out of whack. But I never had any of that kind of problem.

Other Directorships and Memberships

Swent: Then you later went on some other boards as a result of this?

Boyd: Being on the board, yes. For instance, Walker Cisler asked me to come on the board [of Detroit Edison]. Being in Michigan, and his company being a Michigan company. And because I was on the board of Detroit Edison, I also got appointed as the director of the Detroit Economics Club with all the executives of the motor companies. One time I sat between another Boyd, who was the president of Chrysler at that time, and the head of one of the universities around there was William Boyd, then the Boyd who later on was president of the government railroad, Amtrak. They were all there and one of them gave a speech. None of us had blood relations.

Swent: The same meeting.

Boyd: The same meeting. Held in the convention center. It had a very big dining room. We met once a month. We always had a Detroit Edison board meeting at the same time so we could all attend the Economics Club meeting.

Swent: What clubs did you belong to in New York?

Boyd: I belonged to the Union League Club, and the Mining Club, and the Westchester County Club. In those days it was all right. The Union League Club I had to join myself and did so with the help of President Hoover and Harry Morgan.

President, American Institute of Mining, Metallurgical, and Petroleum Engineers

Swent: Were you active in the AIME at this time? Did you have a local section office or anything like that?

Boyd: Yes, I was active. Not extremely active. I never was on the board of the Society of Mining Engineers. I went in as their nominee for the presidency. The four societies nominate the president in rotation.

Swent: Of the AIME?

Boyd: Of the AIME. So I was put up by the Society of Mining Engineers for 1969. That's how I got to be president of that. I really wasn't as active a member as I should have been. I didn't know much of how AIME ran. I took part in meetings and things like that, but I never really held office until I was president. That doesn't happen

Boyd: any more. I think I was probably the last of the chief executive officers of mining companies that became president of AIME. Michael Haider, who later became president of Exxon, was the president of AIME. The great mining executives from Phelps Dodge and so forth also. I think I was the last of them. From there on they grew up through the offices, in the four societies. But the American Mining Congress demanded more of their time and many were lawyers. I think it was a major tragedy.

Swent: Why?

Boyd: Well, because of what has happened. The Mining Society has an office way out in the woods south of Denver. The Society of Petroleum Engineers, PE, has it in Dallas. The metallurgists are not in New York any more. There's just a small AIME headquarters in New York now. The president, the executive secretary of the AIME, is a secondary figure. He's not like the executive secretaries had been up to that time.

Swent: In your day the societies also had their headquarters in New York?

Boyd: Yes. SPE was the first one to go out. The metallurgical society, the mining society, and the--

Swent: Petroleum?

Boyd: Petroleum was in Dallas. They went out before I was president. The rest of them were all--

Swent: And SME and the Metallurgical Society were both still in New York?

Boyd: Yes. Well, I may be wrong. Since I've retired I've been so busy I've never had much time to worry about it. I've been to the meetings. Of course I do go to the meetings. I have been until I served in the church and couldn't go to them. I went to the meeting in February 1987 in Denver. We always have a past presidents meeting. Mr. Hoover used to come to that when it was in New York. We don't go to New York very often any more. The past presidents have no authority. We aren't an official part of the AIME, but they always have a luncheon for us, or a breakfast, in which we discuss what's going on and we make certain suggestions to the new president coming in, and the new officers, how they should handle problems. They normally bring them to discuss before that group. It doesn't do you any good to vote because you don't have any authority.

The societies, they hang together. However, we, the past presidents, have always pressured them, to realize that their main strength lies in the AIME. It has the basic legal authority. Now they've got separate corporations for their societies. They are operated by their boards from where they are. But a large part of the money that comes to them outside of their own dues comes from

Boyd: the endowments in the AIME. I have always argued that it's extraordinarily important for them to keep that because then they speak with a much louder voice.

Swent: Four together.

Boyd: Yes, the four of them. The Mining Society, the Metallurgical Society, the Petroleum Society, and the Iron and Steel Society. But when they go off and have their meetings like that at different times separately--for instance, we would go to the AIME proper meeting and there would be very few petroleum people. We're getting an awful long way from the original AIME.

Ruth Boyd's Responsibilities

Swent: Is there anything you would like to say at this point about how Ruth's life was changing along with yours?

Boyd: Well, Ruth had four children. Until Brown came along she taught school, too.

Swent: Did she ever go up to Michigan with you?

Boyd: Oh yes. One time when, this must have been a year after I had been president. I took my secretary Jean Arre with me because she had just barely gotten settled and I wanted her to meet all the people so she could deal with them at that time. I don't think I mentioned that Ruth was coming too. They were great friends. Both of them ran me. [laughs] I didn't have a chance.

The tongues began to wag. Here I was bringing my secretary up when I came and visited White Pine and showing her off and so forth. Then, of course, when Ruth shows up, and where she goes, Jean goes too, the chatter died very quickly.

Remember we had been married between four and five years before Brown came along. We were married in 1932. She was a devoted mother. Their education, welfare, and my welfare, she dedicated her whole life to all of us. But by the time we had been in Greenwich, Hudson was still in grammar school, Doug was just in high school, and the other two were in college. So she was coming to the end of supervising and raising children.

I was concerned about that. To me that's the worst break for women is when they've devoted their whole life and concentrated on doing that, and suddenly they're without it. That's when I kept not nagging her, but suggesting that she take a more active part in

Boyd: WAAIME. I think that's what helped that break. We entertained not a great deal, but fairly commonly. We always had help in the house and we had this great big house on New Year's Eve.

Swent: I wonder if you did a lot of business entertaining?

Boyd: No, not a lot. I wasn't a very good entertainer. I wasn't really in the business where--we had two salesmen to sell about $100,000,000 worth of copper. Who did I have to sell to?

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You were talking about my wife's activities. She had this household to run. We had a gardener and a maid who lived out in the garden and took care of the garden and did the cleaning of the house. They lived on the grounds and we had a live-in cook or maid. One of them was a woman who had been a nun, a French-Canadian. Since both Ruthie and I spoke French we had no trouble getting along with her. But she passed on, unfortunately. We had trouble keeping help.

Swent: I think you started to say that you had a New Year's Eve party.

Boyd: All the time we were there in Greenwich we had a New Year's Eve party. That means fourteen years. We would invite the mining community who could come. Some people would come from New York. For instance, Mike Haider, who had been president of AIME and also chairman of the board of Exxon, and his wife came. We had plenty of room for people to sleep there, so they would come and stay overnight and go back to New York in the morning or the next day. But most people drove from Scarsdale and Greenwich and up in the country in New Canaan and places like that. There were snow storms about that time of year. We would have eighty or ninety people there for New Year's Eve. We would serve them dinner, except of course we couldn't get them around a table. It was a big house.

She would entertain at lunch many times. She had the WAAIMEs in there. But she kept pretty busy even there. But I began to see her losing interest, and that's when I got her to take an interest in the WAAIME. She was elected president for 1969 and re-elected in 1971. But by the time she finished that then she was beginning to show some signs of poor health. She died almost after the nine years we were in Washington. The first year or two she felt very unhappy about it. Then the next few years she was busy and enjoyed Washington. She had the dog and she would go walking up and down the Potomac. We lived across the street from the Kennedy Center, and we had season tickets to the opera and to the plays and to the concerts. We would be there at least once a week, maybe more often. Then we had the Cosmos Club, and she would rather go there than she would go out to some fancy restaurant. We had a lot of friends there we had meals with. If we entertained much we would do it right there.

Swent: Did you have to entertain within the company, Kennecott?

Boyd: No. I never had to do any entertaining at Kennecott because I wasn't involved in the affairs with other companies.

Swent: And then at Copper Range?

Boyd: At Copper Range there was no need to. We had parties for the directors when we had an annual meeting or when they would come to town. But what you're saying, I really wasn't an executive who had to do a lot of entertaining. I didn't miss it a bit.

Swent: No. I was thinking of it for Ruth's role, that she didn't have to do that.

Boyd: No, she didn't. Well, a certain amount, but that was usually close friends. But she knew how to entertain with grace.

Swent: It makes a difference when you're not selling something, doesn't it?

Boyd: Yes. I suppose my social connections were largely through the AIME and the Mining Congress, because after I became president of Copper Range it wasn't long after that I was on the boards of the Copper Research Association, and the International Copper Development Association. We had those conventions and I would meet all my customers there. I did have a membership in the Rockefeller Center Club where I could always entertain people for lunch, and in the Mining Club, which is not very far away either. We could walk over to the Mining Club, after we put in an uptown mining club.

Travels and Foreign Politics

Swent: Did you do a great deal of traveling? You haven't mentioned that. For Kennecott you must have traveled to Chile?

Boyd: Yes, I traveled to Chile. I traveled to Surinam. I traveled all over the country, Canada, Alaska.

Swent: You mentioned that you speak French. You don't speak Spanish?

Boyd: I don't even speak English clearly.

Swent: Oh, yes, you do.

Boyd: [laughs]

Swent: A funny accent, but-- [laughs]

Boyd: I don't speak it. I've had French, German, Greek, and Latin in school in England, and I never learned really to speak it. My father was fluent in all the languages he had to deal with, Arabian, Swahili, French, or German, and so forth. But I had to be able to read scientific German to get my doctor's degree, and French. With all that background it wasn't entirely too difficult to get by those examinations, but I never had much chance to practice. Even when I was in Germany and France everybody wants to speak English.

Swent: I was trying to think what the political situation was. Did you get involved--this is going back to Kennecott now, but did you get involved in any political--?

Boyd: National political?

Kennecott in South America

Swent: Yes. Did you have to meet with Chilean officials?

Boyd: No.

Swent: Or Surinam?

Boyd: I did when I was in prospecting. Yes, I see what you mean. We decided that we might better get into the bauxite business. The president kept me out of the gold business. But we made some exploration work contracts in Surinam, and I went down there and had to deal with all the officials. I have some stuff that they gave me on occasion. They asked me particularly about building a dam. They had a lot of water flowing through Surinam and they wanted to build a dam. I said, "Well, that's fine to build a dam." But they weren't sure where they could sell their power.

I said, "You provide power and the companies will come to you." We originally thought that the Bonneville Power Administration was a waste of money from the taxpayer's point of view, that they would never be able to sell all their power. Well, it wasn't long before they didn't have enough power to supply the need and demand. Energy is a source that is an attractive business almost anywhere, although Kaiser failed in that in the Congo. They built an enormous dam, power plant on the mouth of the Congo, and I think I saw a picture the other day in the movies, television, that it's virtually shut down. They apparently have not made it go.

Swent: Because of lack of demand?

Boyd: I imagine so. I don't know. All I saw was this. I haven't looked into it and seen.

Swent: I suppose the political situation has--

Boyd: That has something to do with it.

Swent: Did you develop the bauxite property in Surinam?

Boyd: No.

Swent: It was turned down also?

Boyd: Well, in the first place, this was one of the things I couldn't get Kennecott to get me into.

Swent: Couldn't get Kennecott excited about it?

Boyd: Then we were in not only Surinam but we were in British Guiana. I was there. I went down to Chile of course. But I didn't deal with the government very much.

Swent: Do they have any of those things any more?

Boyd: In the new setup inside Standard Oil or British Petroleum they have retained only Bingham Canyon. Their properties in Chile were expropriated in the 1970s. That was lost before they went over to the Standard Oil Company.

The State of the Copper Industry

Swent: In your Newcomen Society speech, given in Detroit on April 16, 1970, you were very euphoric about the future of copper mining in the United States. It hasn't quite happened that way. What has happened?

Boyd: What has happened to the copper industry is several things, and none of them any of us really realized or did anything about. In the first place, the Marshall Plan involved in helping other countries in getting back on their feet. And so places like Chile, the Belgian Congo, which is now Zaire, Rhodesia, these people had needed financial help--and particularly Chile and Peru. So we helped finance them. Our money went down through the various lending agencies in these countries to build these copper plants.

Competition from Socialized Countries

Boyd: In the first place, our grades were going down because we were getting to lower and lower grade ores while those of higher grade were undeveloped. But our technology was still the best in the world. We could mine much cheaper than they could per ton of ore. What that meant was that these countries then built up these industries, and they were not influenced by supply and demand. They were all more or less socialized countries. The people who worked in the mines weren't going to be laid off because the operating bodies politically couldn't take it. The result was they would keep on mining and absorb the loss if they couldn't sell their copper, so the world price would go down, under the selling. That's a massive amount. It took the prices down to what, sixty to seventy cents per pound. It was up to $1.30 at one point.

A Fight with President Lyndon Johnson over the Price of Copper

Boyd: I haven't told you about my fight with Lyndon Johnson, have I?

Swent: No.

Boyd: Well, when I was with Copper Range, Lyndon Johnson was trying to keep the price of copper down, the price of steel down, in the mistaken belief that holding commodity prices down, they would control inflation. They jawboned the industry. It got to the point where we couldn't make any money when the price got below a certain figure. I can't remember the exact figure now because it would change all the time. Price fixing of this nature has an inflationary impact as people in need of a commodity would use more if they could get it. He wanted to hold us down, but he had no legal authority to stop us from following the natural process of supply and demand.

So one day I went down to see a friend of mine who was the secretary of commerce at this time. I told him about this and I said, "We're going to have to raise the price."

He said, "Well, I've got somebody who might be interested in talking to you."

So he sent me over to the White House and I sat down with the three economic counselors. They jawboned me and said that I couldn't raise the price. I said, "Now look, I can sell my copper over in Europe for seventy cents and you're making me sell it here for thirty-two cents," or whatever the figure was. About that difference. "So I've got to raise the price of copper."

Boyd: "Well, you can't do it."

"Well, you haven't got any legal authority to keep me from raising the price, have you?" They wouldn't answer that question. Then the next thing I know is the secretary of treasury, Joseph Fowler, calls me. He wanted to talk about the sandwich coins. Do you remember when they came out? About that time.

Swent: Yes.

Boyd: I said, "Joe, have you got enough of those in your pockets, because you know there's a law called Gresham's law that bad money chases good money out of circulation."

He got kind of angry at me, and then I said, "Think about it now, because if you haven't got stocked up enough of this, then you're going find all the dimes and all the quarters disappearing off the market and there won't be any to run the slot machines or anything. The people will sell them for silver, not for copper."

Anyway, he put it off for six months, and by that time we in Copper Range were making the sandwiches. We would get the nickel that goes in the middle and we would put the two plates of copper on each side and them roll them out to make those sandwiches from which the coins were stamped.

He saw he wasn't going to get anywhere with me, so next thing I knew the secretary of interior, Stewart Udall, called me up. He said, "Jim, I understand you want to raise the price of copper?"

I said, "Yes, I do."

That was Stu--his brother is a congressman from Arizona--Mo Udall. He said, "I wish--"

Swent: This is the third cabinet member you've spoken to now. Secretary of commerce, secretary of treasury, secretary of interior.

Boyd: And the council of economic advisors. Didn't I get anybody else? I guess that's enough.

So he said, "Well, I wish you would come down and talk to me."

I said, "I'd be delighted."

He said, "We work Saturdays."

I said, "Well, I work Saturdays." So I called up my Saturday golf date. I said I would call off the golf date and went down to see him. Here we went down to these beautiful offices Ickes had

Boyd: built into the Interior Building. When Krug was secretary he had a little office about as big as this one where he worked from.

Anyway, I went down there, and who does Stu have but the three members of the Council of Economic Advisors. I said, "I know your story. I've been around here. I've been a bureaucrat. I know what you're up against. But what do I do? I can't make any money at thirty-two cents. I can't keep this company together. I've got to fire them all and lay them off. You have no legal authority to tell me anything, but I'll let you know before I raise the price. It's my responsibility."

Of course, Lyndon Johnson had said, "No," for increase in prices of steel and copper.

So I went back and thought about it for a weekend. I sent my sales manager down to Washington. I said, "You go down over to the White House and you tell them that I am going to raise the price this amount." Two cents a pound I think it was. "As soon as you know you've gotten the message across, call me up and I'll put the cable out." That's how you raise the price. You just tell everybody through the press what your selling price is on a given date.

Swent: What were the other companies doing?

Boyd: They were still there. Only one followed me. Inspiration Copper in Arizona. It was one of the smaller companies, and he followed us.

Swent: Legally could you talk to any other--

Boyd: No, no, you wouldn't dare talk about price. It was all on my own. I didn't have to go up and say, "If I'm going to raise the price, you're going to--." All Kennecott, Phelps Dodge, AS&R, and so forth, Newmont, they all did what the president said and held the price.

Swent: They were all under the same pressures that you were under of course.

Boyd: Incidentally I had a meeting on Monday in British Columbia. Walker Cisler and I were going up to look at the lumber operations to see what we ought to do up in Michigan. The telephone begins to ring in my house in Greenwich, and Hudson was the only one home. He was twenty at that time. "Is Dr. Boyd there?"

"No, he's not here."

"Where can we find him?"

He said, "I don't know."

Boyd: "He's told you where he was going out of town." They called him three times and he finally said, "Now look you're harassing me. If you call me again I'll call the police." [laughs] Anyway, we went on and we charged them--for two or three months I was getting two cents a pound more copper than all my competitors.

Swent: Did they register their unhappiness?

Boyd: No, no. I was a hero.

Swent: Oh, you were?

Boyd: Oh sure. They didn't have the nerve to do it. Well, how much--was I being disloyal by doing what the president asked me not to do when I knew, and I'm sure his economic advisors knew as well as I did, that this would produce just exactly the opposite result from what they wanted? Because what is it doing? It was encouraging people to use copper for things where it was not needed because they could get cheaper copper than it was costing to produce it with the proper amount of profit. You do that and what you do, you interfere with the market. The result is that rather than keeping the price of copper down you're getting it higher. You're not getting the causes for the inhibition of prices going up, which is reduced consumption. If you're going to consume more than they're producing now, or going to be produced at that rate, you're just causing a greater inflation. I never could make those characters understand that.

Well, later on after they had passed this law about access to government information, some lawyers called me up and said, "Will you come and testify in a lawsuit?" Someone was suing someone else and you had to have this price of copper involvement. They had gotten access to the president's files from the White House, and Joe Califano--you remember Califano?

Swent: Yes.

Boyd: He had been the president's assistant. He was telling Lyndon Johnson every day what I was doing. Then one of these memorandums was figuring out what kind of punishment to give us. They were going to cut off our export licenses. Copper was still under allocation because it was just beyond the end of the Korean War and allocations were still going on. They were going to cut off our right to priorities to get machinery and equipment for the mine. All these things they were going to do to us. I didn't know how serious this was. But they realized of course that they would really stir up a hornet's nest. These two small companies were that important in the field. We, Inspiration Copper and Copper Range, only produced 10 percent of the copper.

Boyd: So I think they just ignored it, although the chairman of the economic counselors put out a blurb telling what an unpatriotic citizen I was and so forth. And that we had plenty of money. I could keep the company going. But it was the wrong thing to do and--anyway, I became a hero.

Swent: How did labor feel about this?

Boyd: I don't know. I don't have any way of measuring that. I never heard anything from labor. They never objected to it.

Swent: I see. I should think it would be to their ultimate benefit also.

Boyd: Well, it would be. I don't think they would ever raise a fuss about it. The price of copper since then has gone up to $1.25 a pound. It's gone back now to sixty [cents a pound]. And you can't produce copper at sixty today. Nobody in this country can unless they produce by-products. Except possibly Kennecott at Bingham, because Bingham has the molybdenum, silver, and gold as by-products of copper. There are two or three other rare metals in there which they, because of the vast volume of rock they mine, these by-products are important, and they sell for large prices.

Swent: I was going to say, you had silver in your Copper Range ore.

Boyd: We produced approximately a million ounces of silver a year. In those days we got ninety cents an ounce for it.

Swent: So that helped you, too?

Boyd: Yes, a little bit. Of course today that ninety cents, or $900,000, would be $5,000,000, four and a half million, something like that. It would make a lot of difference. That's what helped Kennecott because they've got silver production there. They've got molybdenum production, and these other metals which are now selling for much higher prices. So Joklik thinks he can--he's spun off the old Kennecott properties. Phelps Dodge has taken on Chino from Arizona, because one of their operations was running out of ore. I don't know who's taken over Nevada, if they're going to do anything with that. Ray Mines, I think they've sold that to American Smelting and Refining Company.

Swent: Is White Pine completely closed down?

Boyd: No. After I left, Chet Ensign became the president.

Rejecting a Merger with AMAX

Boyd: AMAX was after us all this time to merge. I fought it off. I probably made a great mistake for my stockholders. That was probably the greatest mistake I made. Because they didn't have domestic copper production, and they wanted to become the department store for metal. Ian MacGregor was the chairman in those days. I had long conversations with him. I figured he was trying to steal the company from us.

Well, it turned out that from my personal point of view and from the Copper Range stockholder point of view it would have been a good deal. Because that price would have been enough to give them more per share of stock than they could have sold it [for on the market]. And they would have taken me on as a senior executive. I knew the quarrels that went on inside that company. I wasn't anxious to do it. But I fought it off. I think one of the reasons I didn't--the board was all for it. But I don't think the Justice Department [would have] ever allowed it to go through anyway. It was just a lot of work which they, I'm pretty sure, would have stopped the merger.

Swent: Because of monopoly considerations?

Boyd: Yes. Anti-trust, actually. But their lawyers thought they could get away with it, could do it. And they had pretty powerful lawyers. I told MacGregor, "I'm not going to stand here and watch you steal this company from me." He laughed at me. That was before he went over to England. He ran the steel industry for a while for Prime Minister Thatcher, and then she got him to go on the coal board and run the coal board.

Swent: He certainly went through a terrible time there last year, didn't he? He must be a British citizen.

Boyd: Yes, he was when he was over here. I don't know. But someone told me he took out citizenship, but I don't know. Anyway, if he's a citizen, can he take hold of a knighthood from the British government?

Swent: If he's an American citizen?

Boyd: Yes.

Swent: I don't know.

Boyd: I don't think he can.

Swent: Maybe not.

Swent: Did your labor situation at White Pine have anything to do with its closing? I knew some of the mines up there in Michigan were closed because of labor troubles.

Boyd: We had several strikes.

Swent: But the closing a few years ago, when they closed down for good.

Boyd: Oh, you mean just recently?

Swent: Yes.

Boyd: It was the price of copper that closed them down.

Swent: Just the price of copper?

Boyd: That's why you wanted to ask the question. Chet Ensign negotiated a takeover by the Louisiana Land and Exploration Company for Copper Range, then went with AMAX. This man, who is a Colorado School of Mines graduate and an old friend of mine, he used to be in New Jersey Zinc when I was on the board of New Jersey Zinc. His name was Russell Wood.

Chairman of the Board

Swent: We haven't gotten you leaving Copper Range yet, but did you go onto the board then? Did you keep any connection with the company?

Boyd: I stayed on the board until I was appointed the executive director of the National Commission of Materials Policy.

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I had to dispose of all those stocks, and had to resign from all boards and consulting jobs. What I had left I put into a blind trust in the bank. Furthermore, my salaries for being on these boards ceased. People don't realize what people give up to work for the government.

Swent: You've done that several times.

Boyd: When I went to work for the Bureau of Mines I didn't have anything to give up, except my partnership with Ben Parker, who was president of the Colorado School of Mines. We had an operating partnership. I did give that up.

When I went to the Bureau of Mines I didn't have anything. That wasn't any financial burden. It wasn't any financial gain

Boyd: either. They only paid me $9,000-$10,000 a year to be the director of the Bureau of Mines. It got clear up to $14,000 before I quit. Me and J. Edgar Hoover, we got our salaries raised together, clear up to $14,000. Today I think they pay the director $65,000, something like that.

Swent: How long were you president of Copper Range?

Boyd: I went in the first of May, 1960, and left that same time in 1971. Eleven years. The last year I was chairman of the board, not the chief executive officer. Chet was then.

Acquaintance with U.S. Presidents

Swent: So you were dealing with yet another president now. Did you ever meet Lyndon Johnson? Did you know him?

Boyd: I worked with LBJ when he was a senator. When I was the director of the Bureau of Mines he was still a senator. Not often, but I appeared before his committee in the Senate. He was working on stockpiling and so forth, and I would go and talk about it.

Swent: When he was president did you still--?

Boyd: I never saw him when he was president. I just dealt through the press and his associates.

Swent: And of course, John L. Lewis was long since gone by the time you were with Copper Range. You wouldn't have been dealing with him anyway. It was I. W. Abel that you were dealing with at Copper Range?

Boyd: That's right. Abel was the president of the Steel Workers, and we had the steel workers' union. I dealt with President Ford when he was leader of the House from Michigan.

Swent: You would have known him from Michigan?

Boyd: Yes, but I never had anything to do with him when he was president.

Swent: Did you know Nixon at all?

Boyd: Well, I met him casually but I didn't really know him. I talked more often to Ford.

Swent: You've known an awful lot of presidents.

James Boyd, pictured with sons, receives the Copper Man of the Year award.
(left to right: Hudson, James Brown, James, Bruce, and Douglas Boyd) 1965

Boyd: Yes. There was Hoover and Truman. I knew them quite well. I knew him well enough so he would speak to me when I came into a room with him. And Ford, and Eisenhower of course I knew, although I never actually went in the White House to talk with him. Several of my friends, when issues came up in dealing with the mining industry, my Democratic friends would talk to Eisenhower to give me authority. And he knew me anyway. I don't know how well he knew me. Nixon I met casually. I've never met "the gipper."

Swent: Reagan. Kennedy, did you know Kennedy at all?

Boyd: No. I had no reason to ever be in contact with him. I've never known any of the presidents intimately. I've known Hoover more than any of them.

Swent: You must have felt rather close to Eisenhower because of your army association?

Boyd: Well, yes, but Truman stuck to me pretty well. We went through agony together, that period of two years when I was without salary. Or eighteen months without salary, but he had to give me a new appointment--he had to sign his name to my appointment four times. Every time the Congress would go out of session they had to give me a new appointment.

Further Discussion of Mining Equipment

Swent: So, have we covered Copper Range pretty well? Oh, I wanted to ask about the diesel equipment.

Boyd: You're coming back to the Bureau of Mines.

Swent: You mentioned longwall machines, too, and perhaps you should elaborate on that a bit.

Boyd: When I was with the Bureau of Mines, we had a long fight. We approved the use of diesel engines underground as long as they were scrubbed properly. Before anybody could put a diesel engine underground, they had to get the approval of the structure of that machine with the Bureau of Mines, as they did with anything that would spark, or whatever else would cause explosions underground.

Swent: Was your main concern with safety underground?

Boyd: The Bureau of Mines was primarily, and had only authority to enter mines to study accidents, but not to close a mine--the states had their own authority to enforce safety regulations until long after I left the bureau. I kept it from happening as long as I was there, and then it wasn't until eventually, during the Carter administration, when they turned the safety work over to the labor department. They gave in to that pressure from labor. Labor always wanted the federal authority so they could use that as a pressure in their negotiations.

Swent: But you were not concerned at this point with exhaust from the diesel?

Boyd: No. The diesel engine we approved when I was director of the [Bureau of] Mines, had scrubbers on it which removed any bad gases.

Swent: But your concern was fire hazards more than respiratory hazards?

Boyd: The whole safety of the mining. Dust, explosions, accidents falling down mines, anything that endangers a man's life we would deal with. We had recommendations this thick, which we put out. They had no federal power behind them. The states would take these, adopt those as regulations, and enforce them in the states. But some of the states got a little lazy about it, and they didn't stand up to the politicians. I told you that story about Scott Lucas, the senator from Illinois.

Swent: Yes.

Boyd: There's an example of what could be done. But I had to be tough, and even tough with a senator. I mean, I didn't care whether I got fired or not; I had a job to do. I very rarely got any pressure. Any time that any congressman or senator called on me I was ready to show them why I did what I did, and they rarely pressed it.

Swent: You introduced the diesel machines then?

Boyd: No, so the Bureau of Mines approved the diesel as modified to the bureau's recommendations for use underground. The coal miners stuck by their proposition, and they fought it long after we did this. But when it went into Copper Range, we had to have diesel engines. We couldn't have done this without diesel engines. That was done after the bureau approved of diesel engines underground.

Sometimes it would smell. There was an odor from a diesel engine. But if your ventilation is right, there's no real danger. We never had any compensation awarded arising from inhalation of smoke from diesel engines.

Swent: And this did increase your productivity?

Boyd: Yes. We couldn't have done without it. You had to have these big machines to pick up the rock, load it into the shuttle cars. The shuttle cars would take it to underground crushers, break up the big rocks and put the ore on the belts to go--these belts were several miles long to take it up to the mill.

Swent: You also used some innovative longwall machines?

Boyd: Well, we tried longwall. We experimented with it. We got the machines from Germany, and they actually never adopted it as a mining method there. But then we came along with the idea that if we planned our mining well enough so we could extract virtually all the ore and allow the back to collapse, the roof, you didn't need longwall mining. You could mine it in the regular way. We mined it by drilling tunnels, blasting tunnels, picking up the rock with self-loading shuttle cars, and moving it onto belts to take it up to the surface. That was the mining process.

Swent: Then you also used some other kind of conveyer.

Boyd: Oh, then I got the Dasheveyor. This was a system that if you go to Atlanta, to Dallas-Fort Worth, to the airport up at Tacoma, Washington, the Seattle-Tacoma airport, you can ride on trains that run themselves. No driver on them. We figured we could save a lot by designing an automatic system where the rock would be taken up by railroad or a system of that kind, rather on these belts, which are hard to move around. A railroad track is easier to move than these belts were. So we went along with the Dasheveyor Company, and we actually put up the money to build a sample.

But we never could make the electronics work reliably. And the top Westinghouse electronics engineer came to work for Dasheveyor to solve it, but they never really did. This company which we had an interest in would have put into the Dallas-Fort Worth airport, because the Dallas mayor and I had become friends in the Academy of Engineering. I went down to see him, and he wanted us to do it. But he got run over by the politics in Dallas and the city got somebody else to do it. They had a terrible time starting it out.

The mayor took me around with him one day and he took me out to the airport. He had an office out there because he was interested in the development of that airport. He took me out and introduced me to it. His name was Eric Johnson. He was one of the founders of the Texas Instruments Company. And Cecil Green was one of his partners. They were both good friends of mine.

Swent: So you almost got into the business of moving people and luggage instead of copper, or in addition to copper?

Boyd: Yes, we tried. Well, Admiral Radford was once chairman of the joints chiefs of staff. He came out of retirement and was on the board of the Dasheveyer Company. He was a friend of Stan Dashew's. So I got to know him quite well. He was the one that was pressing Stan to get into the people moving business. We didn't row, but we did oppose each other on the board. Because I was putting Copper Range money up to do this thing and I felt that we ought to get priority. Well, it wasn't done when I retired. They liquidated it and used all the steel we had building these rails and things for props in the mine, where they were needed.

Swent: So that one didn't work too well?

Boyd: No. But I think probably our greatest accomplishment there from the mining point of view was the design of these vehicles we used underground. When we went to Las Vegas, [to the American Mining Congress equipment show, October 1986] I was amazed to see how many underground mining machines today are designed with that articulated structure. That was designed at White Pine. We got the company to make them up in the Northwest somewhere, and they're merged into a bigger company.

Swent: What company was it? Do you know? An American company?

Boyd: [It was] an American company. It was a short name, West, or West-something. I don't know how I'd even find that name.

Swent: Well, I was asking if it was American because those exhibits that impressed me so were mostly German. I suppose you had something to do with them too.

Boyd: Well, the only time we dealt with the Germans was to get the equipment to experiment with longwall mining.

Swent: I just mean when you helped their industry to get started after the war. Look where they've gone now. They've really done well.

Boyd: Well, they work harder than we do, you know.

Swent: Maybe that's it.

Boyd: Yes. And they're very good businessmen. When I was in Germany I went down to visit the Bergen Bergschule, the mining school, in Bergen in the Ruhr. All the students were dressed in uniform. They were usually foremen or something like that that had to come back and get retrained. They saw me coming in my uniform and they would [noise of standing at attention]--everybody stood up at attention until I sat down. I would listen to them lecturing in German. These students would answer just like a rapid fired machine gun.

Swent: When you were with Copper Range did you have any connection with the Michigan School of Mines?

Boyd: Oh yes. In the first place, I gave a commencement address up there. I saw a lot of them. We got some of our staff from the Michigan [School of] Mines. The president in my day was a close friend of mine. He was on our board for a while.

Swent: Was there any cross-influence between the university and the companies in the sense of promoting research or designing curriculum, influencing curriculum, anything like that?

Boyd: I suppose there was, but it wasn't any organized arrangement.

Swent: Did they come to you asking for money?

Boyd: No. We had a policy against making contributions of that type at that time because we were not very wealthy, as you can see. We had the same problem as Kennecott.

Swent: But you did probably hire mostly people from the school of mines?

Boyd: No, not mostly, but they got more than their share. They would always come to us. Beginning that they lived there, they would like to stay there. I don't know why anyone would have stayed in northern Michigan with the long winters they had, but they seemed to.

Swent: You retired then because--?

Boyd: I had made it clear that I was going to retire in 1965, so the people down there knew that there would be an advancement and they could be working for it. It was essential. When I got to be sixty-five, the company that had hired me, we had them looking, advising us on who would be next. They weren't happy with Chet Ensign. They didn't think he had enough experience. So we brought him into New York to be the vice-president. Then I went off around the world. I wanted to see whether or not we should be in Australia. It was a year after I was president of AIME. They invited me to come down and respond for the visitors to their Australasian Institute of Mines and Metallurgy meeting in Melbourne.

Swent: Had you been back to Australia before?

Boyd: No. That was the first time I had been back. I've been back twice since then, but that was the first time I was back. We decided that to get there, we would go around the world. We stopped in London and saw my cousin's wife the next time with Clemmie. She died within six months after we left there, so I have no more relatives left in England. Then we flew down to Nairobi in Kenya, then on to

Boyd: Johannesberg, and I talked with people there, and went over to see the copper mines there. Then we went over to Australia and we went up to see the iron mines and so on.

Then I went down to Melbourne for this meeting and had to make a speech. We were in winter and in summer. I allowed Ruth only one bag, and her train case. She did a good job of getting the kind of dresses, including evening dresses, which would stand it. She had a white ribbon dress that she could wear at night or in traveling without any trouble.

Then we went up to Fiji and saw the gold mines there. I had met the manager, and he flew me across the islands. Then we went to Honolulu, and then across. It was during that time that the price of copper just fell apart. Chet was running the company. I didn't know a thing about it, until an acquaintance mentioned it to me in Melbourne. I was gone for about a month.

Swent: What year was this?

Boyd: This had to be 1970. I think you've got most of that now. By this time Chet Ensign had been well enough along to take the company over.

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Swent: So then you were looking around for something new to do?

Boyd: Well, I was going to retire. Ruth wanted to travel. But I never could get her to commit herself. I said, "Now you're going be retired. What do you want to do?"

She said, "I want to do what you want to do."

I said, well, now I'm a member of the Academy of Engineering. The interesting place to be would be Washington, D.C., where I can take part in the academy's business and there would be some interesting things to do, and then we can travel around from there.

The National Academy of Engineering

Swent: What sort of things does the academy do?

Boyd: It's a very big operation. The Academy of Sciences was established by Lincoln to help mobilize the engineering and scientific profession to fight the Civil War. The Congress authorized it as a private corporation, free from government interference, to make scientific studies. It sets up committees and they get the best people on any particular question that's raised in the government about what we do about the subject, what are the truths, and so on.

Swent: So they're advisors to the government?

Boyd: They're advisors to the government and any other agencies that need to know what is closest to the truth, and these agencies pay for the costs of the studies. The members of these committees don't get paid. Rarely does anyone turn down an invitation to serve, for it means that he is recognized in his field. They do that for the honor of doing it, except that their expenses are paid. Such committees, however, need staff to operate, arrange for meetings, and help the members with reports in proper form.

Boyd: The academies formed the National Research Council. This is the operating arm for the committees of the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine. Its annual report on activities takes 450 pages just to list the names, objectives, and members of the committees and the academies. And they have a staff of about a thousand people.

There are commissions, boards, and working committees usually, but not necessarily, composed of members of the academies, to guide the direction of studies and to select the committee members. During the 1970s I served on three boards, chaired two, and served on several committees. I was pretty cheap help because I did not charge for shoe leather getting to meetings in the District of Columbia.

Swent: Which committees were you involved with?

Boyd: Well, I was on three boards: the Minerals Advisory Board; the National Materials Advisory Board, NMAB; and the Materials and Energy Board, which with a little overlap lasted throughout that decade. You are not permitted to serve on a board for more than three years, in order to keep the boards always fresh.

Then there are committees that were established by the boards to undertake the study for something specific, one of the Bureau of Mines, or the Defense Department, or somebody else wanted to know something about. The boards or commissions would then select them. For instance, the last one I had they asked me to be chairman of the committee on surface mining and reclamation. They knew we were going to have trouble.

So they selected a committee for me. One man I refused to take. I said, "You get another chairman if you insist on having him."

They had on there the executive director of the Sierra Club, for example, and we had a lot of really fine experts on environment, on mining methods, on hydrological questions, and all the things that had to do with reclaiming the land after surface mining.

Swent: So this really pulled in all of your interests, didn't it?

Boyd: Well, the Congress asked for the study, and the president set up the Council of Environmental Quality to write the contract. It's actually written directly by the Academy of Sciences. Then one of the boards, or one of the commissions in the academies, selects the members. I was selected to be the chairman. The NRC negotiated a contract with the Council of Environmental Quality, in this case at the request of Congress.

James Boyd (seated at right), Executive Director of the National Commission on Materials Policy, and Members of the Commission. 1972

Boyd: So they went and testified before the congressional committee. They said, "Who's going to be the chairman?"

They said, "James Boyd."

Two of the senators said, "Well, we'll get a good report." Remember, I had been executive secretary of the National Commission on Materials Policy which reported to Congress in 1975.

When I first went down to Washington, I went down there to just have something interesting to do. We bought a couple of Watergate apartments. We were across the street from the Kennedy Center. I could go out and play golf, and we could go to travel where Ruth wanted to go. I hadn't been there two weeks before the secretary of interior started looking for a chairman. The administration wanted me to be chairman of that commission. But politically they couldn't stand that, and what they did was pick the president of one of the big scrap treatment companies. The press came out and said that the lousy commission was set up under a junk dealer. This was a very fine man, Jerome Klaff. His company produced alloy steels from carefully alloyed scrap.

Executive Director, National Commission on Materials Policy, 1971-1973

Swent: This was the Commission on Materials Policy?

Boyd: That's right. I spent two solid years of the hardest years of my life as executive director. Actually, the executive director runs the daily operation. It wasn't long before the chairman, who was the man I'm telling you about, established a fine relationship. And of course we became close friends. But he left me to run it. When he went down there and they said, "Well, now you're going to have Jim Boyd as your executive director," he said, "Now are you going to tell me I'm going to run this thing?" Then he realized he knew me. I had been to one of his scrap meetings. Then he changed his mind. I never did anything of any importance without talking with him on the phone, and he would come into Washington frequently. He would attend to the political problems while I attended to administration.

Then I had to get staff. How do you build staff? There were groups of people down in Washington that really think that they're the top of the world on commission staffs, and they kind of make a business of getting on staff. They began to pour in on me. But then one day I was at the Cosmos Club, and I needed somebody on forest products. I asked a friend of mine who was there.

Boyd: He was the director of the Forest Service in the Agriculture Department. He was director when they got Smokey the Bear. So we always called him Smokey the Bear. I said, "Who do I get to come and help me do it?"

He said, "Will I do?"

I said, "Why of course you'll do." I couldn't believe my ears.

He said, "Well, I'm about to retire and I would like to finish my career doing something like this." And he did a splendid job. His name is Edward Cliff. He wrote a separate report on forest products and most of the recommendations in that report were later adopted.

Then I called Thomas H. Miller, who had retired and who was my deputy when I was director of the Bureau of Mines, and he had done some consulting work for the Mining Congress when I was working on the safety committee. I called him up and I said, "Tom, I've got this job to do. I can't do it without you. I'm not going to take the job unless you come on the staff."

So he came on as the assistant director for departmental affairs, being able to go and talk to various parts of the government, who would have any concern with our work.

[Date of Interview: November 9, 1986] ##

Boyd: I had kind of become one of the two or three people the Congress and the government depended upon for advice regarding national policy on materials. I would frequently appear as a guest inside the government in interdepartmental meetings. They would invite me in there at the end of the discussion while they were discussing a question between the State Department and the Interior Department and so forth.

I had a lot of friends in the academy on the staffs there. The assistant secretary of the interior for minerals, Hollis Dole, had been working on getting a commission going. The White House wasn't at all anxious to have that commission.

Swent: Who was the president at that point?

Boyd: This was Nixon. But the Congress wanted it. They wanted to be brought up to date. Remember, the last commission on materials was the Paley report twenty-five years earlier. The Congress approved the formation of a national commission rather than an executive commission. The White House had to find a way to get it staffed. When you have a commission, it comes under the jurisdiction of some committee of Congress.

Boyd: That didn't work out, so they set up a commission. The president had to appoint a board. The Interior Department wanted me as the chairman, but they decided in the political view that they would have somebody who was in the business. They picked Jerome K. Klaff as the chairman. I think I told you this.

Swent: Who is "they"?

Boyd: It would have been the assistant secretary of the interior, Dole, primarily.

Swent: So they could hire a staff and appoint you without going through Klaff?

Boyd: I think they suggested to Mr. Klaff that he ought to take me. He was feeling put upon, then he realized he did know me, that maybe I wasn't so bad after all. He later on admitted that maybe it was the best thing that ever happened to him. I've been so much, since the beginning of the Second World War, going through as director of Bureau of Mines, and being on commissions, presidential commissions or advisory committees for the White House on what you did in an atomic attack and things like this. I was frequently called down to meetings of that nature. They had one committee within the executive branch, an interdepartmental committee, set up. I was appointed by the secretary of commerce to sit on and to advise him on that side of the committee. I actually sent Julian Feiss, who was my assistant, down to spend some time down there so he could do all the leg work for me.

That never occured to me that I was very important to this business, but I did seem to get called up, and the people did seem to pay attention to what I was saying.

Then Klaff agreed. Then it was between Klaff and me. The commission was established by the president. These people that I showed you the picture of in there were the commissioners, and the secretary of the interior, Rogers Morton, who was sick, so that Dole represented him frequently; the secretary of commerce, Maurice Stans, followed by Pete Peterson, and finally Dent, who finally signed the report for Commerce but never took an active part. Throughout the work, Commerce was represented by Owens, who practically served as a staff member.

Then the executive president of the Academy of Science, Fred Seitz, was on this commission. He by this time was the president of Rockefeller University in New York. Then the great environmentalist from Indiana, Keith Caldwell of Indiana University. The retired president of the Glass Bottle Blowers Union--Minton--he was a pretty intelligent guy. On the petroleum side, of course, was the chairman of the board of the Pennzoil Company, Hugh Liedtke. He's still the chief executive of Pennzoil.

Swent: A couple of these people issued minority reports, didn't they?

Boyd: Yes, that's right. That's always done in these reports. Anyway, about this time I went off to the hospital. I wasn't practicing my Christian Science, and I had a prostate operation. I think the third day I was in the hospital after the operation I was on the phone. The staff had been set up and I was supervising the work from there. As soon as we got the recruitments going they got their work started.

Building a Staff

Boyd: The assistant directors I had there were the one that I told you about, was to do the forest products, Ed Cliff. Owens came from the Commerce Department and was given time to work on the staff. Assistant director for the Bureau of Material Supplies. Despite three secretaries who did not attend meetings, Owens represented them all and was very helpful. Cosman followed George Watson when he left to become president of the Ferro-Alloys Manufacturing Associates.

Tom Miller. One of my closest friends.

Swent: Director for government liaison?

Boyd: Yes. I said I wouldn't run the show unless he agreed to come before.

Swent: That was a very important spot wasn't it?

Boyd: Yes. He was very extraordinarily useful. Miller and Cliff were two experienced bureaucrats. I needed that kind of experience, and they knew how to do the infighting.

Clauser came in and he was busy doing two other jobs, so he could not really do the editorial work.

Swent: And then he died.

Boyd: Yes.

Swent: He's still listed here as editor, however.

Boyd: Well, he was the beginning editor. Alvin Knoerr was the editor who really wrote the report. He had been the editor of the Engineering and Mining Journal in New York and he was a very powerful writer on this. The structure of this thing is due primarily to him. Of

Boyd: course, each section was the responsibility of the division directors and finally the report had to have the approval of the commission members. It was very well done.

Swent: I was really impressed by how clear and concise it is.

Boyd: All of these people of course helped write it, but the fellow who kept it going all the time was Alvin. Al we call him, Al Knoerr. Eleanor Pollock was the assistant director for public affairs. She was a lady and a staunch Democrat, and environmentalist, but she never used the commission to further her prejudices. She was a very good public relations person. She handled the press. She took me to lunch with fellows on the televison the other night, the public attorney who gets his name all over the place. He's all for seatbelts and airbags for automobiles. You must know his name.

Well, and Charles Ryan was another one that came in there. He was an Irishman and he was a wild Indian, really, a bright fellow. He didn't like what I was doing and he was undercutting me. I had to finally cut him out, and he knew what was happening there. It was a problem.

Swent: Was this a philosophical difference?

Boyd: No, it was pretty fundamental. These were people that believed in all these theories about far-out environmental questions and things like that. But we gave it serious consideration.

Swent: You were plunged right into that, of course. Part of your charge was to enhance the environment.

Boyd: These other people in the professional staff were people that came in and out. Gloria Adams was my secretary and she was very good. She went up on the Hill later when she left me. And so on. I don't think you need to go into that anymore. But this took two solid years, to do the whole thing, and a budget of $2,000,000.

Swent: You produced a preliminary report I noticed, a year before.

Boyd: Oh yes, we produced three preliminary reports. First we produced "Towards a National Materials Policy"--"Basic Data and Issues," and "World Perspective." And then "Materials, Energy, and the Environment: the Need to Produce, Conserve, and Protect."

Seminars at Universities

Swent: What connection did you have with academic institutions?

Boyd: One of the interesting things we did was to set up forums throughout the country at different universities, like Stanford, UCLA, MIT, Colorado School of Mines, and Georgia Tech, and discuss the policy questions with them. We held a seminar in each of these universities while we were beginning to see where we were going to gather the information. We called up people in the Futures Society and got them to talk, some of these real brains. They say they can't predict what the future will be, but they can look at things that were happening that will affect the--things can happen in the future. It's a very big organization today of people who do this. We had seminars with them.

Then we had people who came in in some of their seminars, such as Link Gordon, who I had worked with during the war, and was later president of Johns Hopkins University and our ambassador to Brazil. Then we went over to the Wilson School of Foreign Studies, which is a high-level think tank for looking at policy questions like this. Some great people came into that. A fellow who has been very well known and had several cabinet posts--Elliot Richardson.

Swent: I was wondering about your choice of Wharton to do this major report that came in here. Was this something that they had already been involved in, or did you just think Wharton School of Finance--

Boyd: No, no, we paid the Wharton School, and we had Bill Malenbaum come down and be with the staff and then go back and write that report on economics. But we did a lot of that.

Swent: How was the choice made to use Wharton for this?

Boyd: At this time it appeared to us that the program they established was the best available to project consumption of raw materials. It was under Professor Wilfred Malenbaum. The study was entitled "Materials Requirements in the U.S. and Abroad in A.D. 2000."

Swent: So it was something they had already--

Boyd: --already been doing, and then they brought it up for our purpose. They wrote a report for us and we published it as a contribution to our conclusion. There were a lot of things we published or we put out, that served our objects, but did not necessarily back up our conclusions and ended up in the Commerce Department's library. If it wasn't actually published in report form, all those things went into the Commerce Department's technical library.

Swent: I was particularly interested in the connection with the universities. How did you choose which universities to have committees at, for example? Did they approach you?

Boyd: No, no, we approached them. We picked the places that were expert in these particular fields, and we got them spread over the country. In the East we went to MIT, in the South we went to the University of Georgia Tech--in the central part we went to the Colorado School of Mines. Then in the far West we called on UCLA and Stanford. We would have meetings up in Tahoe. The Stanford meeting was held at Lake Tahoe. And we had all those great people from the geology department and the mining school of Stanford, Charlie Park and people like that. When we got down to UCLA, we had the dean there, Chauncy Star, who later became the president of the Electrical Power Research Institute [EPRI]--his successor is a friend I worked with later on in another committee.

Then we would talk to staffs on the Hill. We would discuss about people who had particular legislation due. Perbix was an interesting young German. I got him from the steel industry. These people had to hunt up the literature and things like that. You'll see his name in the report.

Swent: I remember the name. I was just checking the spelling.

Boyd: And then, of course, we had Ed Cliff and so forth, and each of them had their own sections to run.

The Long Range Issues Conference

Swent: You also had a major conference, I see, that was listed--at least I assume it was major--towards the end.

Boyd: Is that the one in Denver after the report was out? We hadn't met with the press.

Swent: Long Range Issues Conference.

Boyd: That's the one I'm talking about.

Swent: That was up in Long Island?

Boyd: Yes, that's right. That's where the futures people came into the picture. And these were pretty powerful people.

Swent: That was the Long Range Issues Conference?

Boyd: Yes. People had to think in these terms in order to be able to see what was going to happen. They were always wrong, because the very existence of their report will make it wrong. So you don't go there with the assumption that they're going to predict something. You go there [thinking] that these things can happen unless other things come into effect that will change them.

Swent: What were some of the pressures that were on you from various constituencies?

Boyd: We always had a problem with the environmental issue. I've got another report that comes out I'll talk to you in a little while about. There's an Academy of Science report which I ran. That's the Committe on Surface Mining and Reclamation. I've talked to you about that. That was after this report. But we were careful to get environmental people on the committee so that we could be sure that we were taking environmental questions into consideration. Because you can't get raw material resources without doing some damage to the environment, and that had to be taken into consideration here.

Some of the staff were environmentalists. I had to contain them. For instance, I went down to see Jerome Klaff. He had a house down in Florida and I went down to a meeting with him for two or three days, and while I was gone I came back and Ed Cliff, and Tom Miller, and other senior people were saying, "Well, we had a Caine mutiny while you were gone." These youngsters were going to go up and say I was running this thing by myself.

I think I got out of step because I listened to all of them. Then I said, "Remember, there's only one vote in this thing."

They took this seriously, but of course, everything they talked about was a vote, but they all wanted their own way, particularly that Irishman I was telling you about, Charles Ryan, who I really loved. He had married a French girl, had five children, she had run off and left him, and he was doing our work and raising these four or five children besides. He later on went up to MIT to work for Professor Forester and the great engineers up there that did conservation work later on. I think he's out at Stanford now.

After all, I was the executive officer. We had a commission to work for, and I took my orders from the commission, not from the staff. That's where you're standing between. This wasn't easy.

Problems With the White House

Boyd: In the meantime, the White House didn't want this report. They weren't the least bit interested. I sat next to Ehrlichman at lunch one day and I couldn't even get him to talk about it. Then the oil

Boyd: people went to the White House and put in a paper into the White House one time. The chairman of the Council of Economic Advisors called me up and just gave me holy blazes. I said, "Well, I haven't seen this report. It's never been given to me."

So they went around behind my back and put it in there.

Swent: Sent in a part of the--

Boyd: Yes, he may have been one of the commissioners. He wanted his viewpoint to be put through the back door of the White House instead of letting it come through the commission. That kind of thing gave the White House political problems. So we didn't get much help from that quarter.

Swent: Now to get this in the context of the time, I notice there was a tremendous pressure obviously on oil and oil versus coal, and the whole energy section in the report seemed much more anxious. So that was after the big embargo time?

Boyd: Oh, before.

Swent: Or was it just before?

Boyd: Yes.

Swent: I was thinking 1973 was--

Boyd: We finished it. We were there in 1971 and 1972. We finished it in 1973.

Swent: It wasn't printed until June 1973?

Boyd: Yes, but we finished it before--

Swent: It was that spring that we were standing in lines to get our gas.

Boyd: That's right. It came after this report was out.

Swent: Right.

Boyd: The effect of that embargo didn't really take place until 1974. That's the next story.

Swent: All right.

Boyd: I get ahead a bit. Let's finish the commission first and come back to that.

Swent: All right.

Finishing the Report On Time Within Budget

Boyd: Well, the result was that we wrote the commission report. We were running out of time because we were to report to the Congress at the end of May. So I put a little pressure on them and I made a date to go and visit my son who was in Germany. Two years of this was time to go. I didn't have any vacation or anything, even weekends.

Swent: That must have been a tremendous pressure.

Boyd: Finally Rogers Morton, the secretary of interior, was beginning to put the pressure. He called me up to his office. I wanted him to sign this report. The commissioners were to sign it. He said, "Well, the staff wanted to have time to do some thinking about it and so forth."

I said, "Well, Mr. Secretary, we run out of money at the end of this month. The report's supposed to be in by the end of May."

He said, "Well, we don't pay any attention to that deadline."

I said, "Well, Mr. Secretary, I do. I consider that my deadline. I've worked up to that point and I'm leaving."

So he turned to his staff and he said, "Well, you guys better get busy."

Do you know he signed that report in the Interior Department on my way to the Dallas airport to get on the airplane. That's how we had to get it. Then I was able to take it. I went to see the leader of the House, Carl Albert. I said, "Mr. Chairman, we have finished this report on time within budget."

He was very pleased, because these commissions were coming up and spending millions of dollars beyond their power. And they didn't do them on time.

I think that covers most of it.

Swent: I wanted to ask you for my own edification, what was the connection with the National Materials Advisory Board? Who were they? They published an approach for systematic evaluation of material structure application, it was quoted.

Boyd: It was NMAB in the National Research Council. The commission had three contracts with the Academy of Sciences.

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Boyd: We had. I don't know why I say, "I had." We had.

Swent: So that was a board of the Academy of Sciences?

Boyd: Yes. They called in their experts on the field from the outside to get us an independent report. I think three reports they made for us. I don't remember them all right now. But they had a marked effect.

Swent: So you could go to all these academies, universities, wherever you wanted. Battelle Memorial Institute was one of these.

Boyd: Yes, we had a contract with Battelle. We paid for these.

Swent: I'm trying to get a picture of how all this worked. You were really pulling together information, also serving an educational function with these seminars and conferences.

Boyd: Well, we went to the seminars to get input from the academic community.

Swent: But they also must have been--in turn those seminars were--

Boyd: Yes! We contracted for the expense of holding them; we went to listen to experts. We went up to Arrowhead with UCLA to debate the issue. They submitted reports and we considered their reports when writing our report.

Swent: They were exchanging information? They were learning from the seminars, too?

Boyd: Oh yes. And we paid the cost of those seminars, out of our budget. And of course we had people who were to go to industry. Each of these people would go to their industry they covered and talk with their chief executive officers and the knowledgeable people, like people in Kennecott, and--didn't have to do it in Copper Range. American Smelting and Refining had some suggestions we were unable to agree with.

Swent: I was interested in the fact that you used the very broadest definition of materials.

Boyd: Yes. Materials are the stuff that things are made of.

Swent: The only thing you excluded was food.

Boyd: That we were instructed by the Congress to do. We didn't include food. But fertilizer, and lumber, and minerals, and things like that. The stuff that things were made of.

Swent: Coal and all the energy sources.

Genesis of the Commission

Boyd: There was a professor and a man in the staff of the Library of Congress who was very interested in this field. He established a conference of the engineering societies which met every other year up in New Hampshire. The first of these meetings I went to when I was with Copper Range still. The senator from Delaware was up there. In those days I had an airplane, so I went up there and I had to go on time and get back. I brought him back to New York so he could get home quicker. But he was the one that set up the commission in the Congress. He wrote the bill to set up the commission. I can see him there. These names we can add.

Swent: So the impetus came from a congressman?

Boyd: From a senator, yes. But it came from the committees that these people sat on, but he was the one that authored a bill and stayed with us right through. He later got defeated because he got over-confident. But anyway, he was very helpful to us. We as the members of the commission were up on Capitol Hill frequently keeping in contact with him.

Now, the report. At the beginning of this report, I started to tell you there was another report written twenty-five years before and it was called the Paley Report. I went up and saw Bill Paley in New York and spent an hour and a half with him.

Swent: Was he with CBS?

Boyd: Yes. I had met him during the writing of his report because as director of the Bureau of Mines, they had to depend a lot on the information coming out of the bureau. So I was quite active not as a member of the staff, but I would talk to him frequently. I met and started to work with Bill Paley at that time, so he gave me some wonderful hints, and one of them was that we should get an editor in the beginning. That's the reason I got those two editors. And one of them had to quit, but Al Knoerr came in to replace him. So you started writing your report from the very beginning. That's one reason it's so well done. I can't take any credit for it except to get good advice, and I got people to do it. You never can do things alone--you're the guy that has to beat heads together to get them to do things, and to get people to give and take.

Like all these international conferences that are going on today. No one is happy to give up his belief. In a job like this you've got to beat some heads together to get some answers. So I would get kind of Caesarish once in a while and put my foot down. But the commission backed me up. You notice that except for some minority suggestions they all signed it, including the two secretaries, of interior and commerce. Pete Peterson was the

Boyd: secretary of commerce after Stans, and then finally the man who signed the report was the third secretary of commerce (Dent) we had to deal with. The secretary of interior was always the same, but as I told you, he wasn't there all the time.

Results of the Commission's Recommendations

Boyd: Let's finish what happened to that thing. Later on I got the Bureau of Mines a few years later to go over the report and see what recommendations we had made in there that had been acted on.

There was a report by the Bureau of Mines which we'll have to dig up--I don't know if I've got a copy of it or not--showing what had actually been done. Most of the stuff on the forest products area that had been worked out under Cliff were adopted. They didn't require legislation, and even some legislative matters were affected by this report. But the really big questions weren't, the really tough ones, the political questions that had to do with the impact of the environment, the support of the industry, and so forth, they never got anywhere in the Congress. By this time, you see, I was out.

Swent: Now, the big things that you suggested, such as a department of natural resources, which of course hasn't happened--

Boyd: No, that hasn't.

Swent: Taxes--what about your suggestions in that area?

Boyd: The tax questions, they've gotten worse instead of better.

Swent: Been ignored?

Boyd: Yes.

Swent: Incentives for research and so on?

Boyd: Some of that was coming. You have to get in and see. There were 117 recommendations in here. I haven't thought about them for ten or fifteen years.

Swent: I was wondering which were the ones that you thought were the big ones that were not implemented.

Boyd: Well, these were the questions: the access to the forests, to the wilderness areas. We lost that battle. The government shouldn't freeze the minerals industry out of great vast areas of country because you don't know what's in them until you start drilling, and

Boyd: so forth. The fact of the matter is that mining is a very tiny part of the use of the public domain, a tiny part. I had a picture. Before this commission--did I mention to you that when I was president of the Mining and Metallurgical Society we used the Jackling Fund, hired a man to do research on the Wilderness Bill?

Swent: No, you hadn't mentioned that.

Boyd: Through the Mining Congress we testified. We used this report. I testified before the congressional committees with this report, and it was submitted that way. In that we had a map showing to scale the biggest mines that are known, like Bingham Canyon. Across the room you couldn't even see them on the map, they were so small.

The effect of mining, although it looks like a terrible insult to the ecology at a particular point, when you take it all in all, the Bureau of Mines had done some work on this and they determined that less than three tenths of one percent of the whole surface area of the United States has ever been damaged by any mining, and that includes sand and gravel, limestone and rock quarries, copper mines, iron mines, etc. Add them all up and less than three tenths of one percent, and a lot of that has already been reclaimed.

I use as an example a place where I have some pictures of a limestone quarry down in southern Colorado. I hadn't realized until I had Congressman [Wayne] Aspinall up in my apartment for dinner one night, and we had the Italian ambassador also. We were looking at the Kennedy Center, and beyond that the Lincoln Memorial. The ambassador from Italy pointed out that that marble on the face of the Kennedy Center was a gift of Italy.

Then the congressman said, "Well, the marble in the Lincoln Memorial comes from Colorado."

And yet you can't even find that source. I've never been there. There are no roads leading to it anymore. You wouldn't know that quarry was there unless one had a picture of it. It didn't do any damage to the environment to create that beautiful monument.

Swent: But it has enhanced the environment in Washington considerably, hasn't it?

Boyd: Sure, in the long range it has enhanced the environment.

Swent: And then made accessible to a lot more people, too.

Boyd: That leads into what we were discussing. There are so many complexities in my lifetime I don't know if I can get it all in. That's why it needs some thought when I've got something to work with.

Boyd: Well, I think we've now covered that in general.

Swent: There was a follow-up report done by the Bureau of Mines?

Boyd: This was two or three years later. It was done by the Bureau of Mines. I'll be able to find that. I've got a great friend who came out of the Academy of Sciences and was my staff man, and the editor of my environmental report, who is now in the Bureau of Mines. Anything that we need of this kind of thing, all I have to do is call him on the telephone and he'll dig it up for me. Bob Horton's a friend of mine. They'll do anything for me. He is no longer the director.

Swent: Did you feel, though, that some of your recommendations were implemented?

Boyd: Yes. The great majority of these numbers were done, but they were things that could be done by executive action, not that you had to go through all the political maneuvering to do. Now, the Congress did some of it, but very little. There was no interest in the Congress, really, as a body, except a few people. A lot of those got defeated in this last election. For instance, the strongest one was Senator Harrison Schmitt of New Mexico, and he got defeated. He was the only one in the Congress who had any scientific background of any consequence at all. That was a terrible loss to the scientific community when we lost him.

Swent: But you finished on time and within budget?

Boyd: We finished on time and within budget. The speaker, Carl Albert--he beamed. He had been receiving reports all the time and I think this was the first to be on time.

Swent: You said you had trouble with staff?

Boyd: This Irishman I was telling you about was going to sue me because I had some money left, instead of keeping his job going. The report was finished, we had done our work; he wanted me to keep him on the payroll. That was the kind of thing you got up against. I thought the only way to do that was for me to leave. There wasn't anybody else left to run it. Everybody wanted out to go back, except these people who make a profession of working on commissions.

Swent: You handed the money back to Congress.

Boyd: Yes, we didn't spend some of it. We didn't have to ask for more.

The next thing that came along was the--now this is the more complicated one--the Academy of Sciences was asked by the Energy Department of the White House to make a thorough analysis of the energy situation. So the Academy of Sciences set up a Committee on

Boyd: Nuclear and Alternative Energy Systems. CONAES, it was called. This was headed up by a lot of very powerful people in the scientific and economic communities. One day, one of the members of the Academy of Engineering called me up and said, "You're going to be in charge of the resources."

Chairman of Resources Panels, Committee on Nuclear and Alternative Energy Systems of the National Academy of Sciences (CONAES)

Boyd: I'd had enough committees before. I didn't want any more of this, but they put it in such a way that what could I do? I became the chairman of the resources panels. I had resources panels on oil and gas, on coal, on oil shale, on uranium for atomic energy, and one was on lithium, which seemed to be needed in the fusion area, which we weren't too sure about. It quickly turned out it wasn't a problem, so we didn't finish it. But the other ones we had very large and very powerful committees on these things, until the uranium people had to pull out because they were under indictment for anti-trust action, and they couldn't allow any of their people to serve. Who was the chairman of the very famous company--he has a house here in Carmel. He's from Oklahoma City. He's partner with a senator.

Swent: Dean McGee.

Boyd: Dean McGee. I called up McGee and I said, "I'll need your best brains. Here's the guy I would like to have."

"You got him." Then he called me up in about two or three weeks to tell me I can't have him. But he said, "You can talk to him all you want to, but he can't serve on your committee."

I set up committees within the academy. When you do that, you have to get the best people, and rarely does anyone turn you down. They've got to give their time, and you have as few meetings as you can, and then pay their expenses. This was a several million dollar contract. We had a budget to do that. So my reports were all done within a year, but the arguments between the economists and the environmentalists and all the other things that were brought in there--this was not the kind of thing the academy should do. It took them I think five years to produce the final report. [sounds of searching] Well, I can't find it now. This is the Paley report.

Swent: That's the one twenty-five years before yours?

Boyd: Yes. Now, the things they predicted didn't come about for the reasons I told you, but it was a very good report. He was very jealous of it too. Later on when we finished the report and we

Boyd: wanted to get some publicity for it so that it would have some meaning, he immediately put on a show going back to his report, never mentioned the commission's report. There's one of the reports from the meeting at Stanford.

Swent: I see. [reading] Stanford University Forum. National Commission on Materials Policy, May/June 1972, background document. This was one of your source documents then for the final report?

Boyd: That's right. And we had millions of these--not millions of them, but we had a million dollars worth of them, because these were all carefully selected people to write these things. They will appear in university libraries, probably well used at the time. There were five of these.

Swent: I'm impressed that you could do that and this within two years.

Boyd: Well, we worked for that.

Swent: You must have worked very hard indeed, yes.

Boyd: Well, I suppose I make people work.

Swent: You must make them like to do it or they wouldn't.

Boyd: I was amazed really when I got to Copper Range that when I would go up to the mine and I went up there once every month or so, and I would call a meeting in the afternoon and I wouldn't let that meeting go until we had finished--they had parties going on and things like this. I could see they were getting itchy, but I made them stay there and work. That's the way. I guess I got that from working in the wartime. In wartime time has no meaning. You work until you're out on your feet. And you had to learn when you get your rest. If you're fighting out in the jungles you don't get much chance to rest either, you know. I remember I told you one time that General Clay, I went to him and said the industry people on this job we had got about getting nickel properly distributed were getting very tired and weren't able to do it.

He looked up and he said, "Jim, in wartime people die for their country."

But we were never allowed to go home from Clay's office until we had cleaned up every piece of paper that came across the desk. So I guess I learned.

Swent: What a habit to form!

Boyd: Yes. I still try to do it today. But it doesn't look like it now. [laughs]

Swent: Paperwork has multiplied.

Boyd: Now, any more we want on--

Swent: So this Nuclear and Alternative Energy Systems Project, was that another two years again?

Boyd: Well, I didn't work two years. My work was done. I had all my reports in. One of the top geologists at Cal Tech, Lee Silver, was the chairman of the uranium committee. He came to Washington, and we had a guest room in our apartment in Watergate, and we turned our guest room over to him. He would work all night long. He didn't get more than two or three hours sleep, but he was a wonderful writer, and is still, I guess. He talked to the top people on uranium. Then we had a meeting and I would go down with him, and I would be usually present when they were in the final wrap-up. I couldn't be in on everything, of course, but I had to keep the pressure on. I probably learned from those sources.

Swent: You've come a long way from copper now.

Boyd: I didn't have much to do with copper from there on, because I was off the board; when I took over the commission I had to resign from that board. I had to resign from the Detroit Edison board, from the Felmont Oil Company, from the Copper Association Boards that I was on there. I lost all that income, too. They did pay me to be executive director.

Swent: Did you go on any boards again after this report was finished?

Boyd: No. Only in the academy. After we got started on the CONAES report then I began to do more work in the academy because my work was pretty well done on CONAES. I would attend some of these meetings. I wasn't on the CONAES committee itself. I was the chairman of a group of panels that were working on resources. So I would have to attend the meetings. Our group was called the supply-delivery panel. Then we had panels under that, and I was chairman of the sub-panels on resources and supply and delivery. Which of course included the power plants, and the coal mines and everything like that.

Swent: Did you get into transportation at all?

Boyd: That always came into it, yes. We had transportation people on our committee. We turned in our report, and then I got interested in doing other things now because I had done my work and I could always come back; I was still on the committee, if they would have a meeting, but I had written the reports and turned them in, and they were into the main study. But they kept on working for five more years before they got that big report out.

Boyd: Some of these economists were right. I just couldn't believe that the consumption of petroleum was going to decline, and the economists saw this. Partly as the result of this report the Congress required the automobile industry to establish targets to reduce the consumption by increasing the mileage of automobiles they built. They had to achieve a specified average miles per gallon within a given period of time. By this time of course the crunch had come from OPEC, so the price of energy went up just like this. There's nothing like price to effect change. People began to reduce the distance they traveled. For instance, if you're running a manufacturing plant and you haven't got the plant insulated, and you're pouring energy out of it, if you're only paying ten cents a million BTU, you don't pay any attention to it. But when it adds up to fifty or sixty cents per million BTU you begin to do something about it.

Swent: And you insulate in a hurry.

Boyd: So there's nothing like economic pressure to make you do these things. Those kinds of things did actually affect the consumption rate. But still, the conclusions we came to indicated that world-wide improvements in standards of living would necessitate changes in sources of energy consumed. One of my friends projected the fact that we were not finding oil as fast as we were consuming it, and that by a certain period of time the U.S. would reach a peak of oil discovery, while the rate of consumption continued upward. That would happen in 1969. And it did.

Swent: Right at that time?

Boyd: Within a year or so. Of course, when OPEC came along and the price of oil went up there, then people began to conserve oil. Manufacturers in their plants, and the people who were all the big consumers of energy would start reducing consumption. A lot of people couldn't afford to run automobiles. Other people didn't go so far as they used to. All these things reduced the consumption. So suddenly with that high price there were people all over the world going out and finding new oil fields, which are going to cost more to produce, and you suddenly have a glut of oil. That's where we are now, and it could within the next few months disappear again. We can be back in the crunch, because we're just not finding oil as fast as we're consuming it.

Swent: Of course, even if the rate goes down, the total consumption can go up with the rise in population.

Boyd: Yes.

Swent: When did your interests expand into the human resource angle? There wasn't anything in this commission report on population.

Boyd: This would probably be in the next thing that happened to me.

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Boyd: I got appointed to the Academy of Engineering in 1967. I was still at Copper Range. 1967. I sneaked in the back door. I couldn't get in there today. I'm sure I wouldn't because I [don't have] the capabilities of the other people in the academies.

The Academy of Engineering and the Academy of Sciences are under the same umbrella. It was started as the Academy of Sciences under Lincoln. Then during the First World War it did a lot of work as the Academy of Sciences in helping the scientific problems in the First World War, and similarly in the Second World War. It began to be clear that the scientists were controlling the Academy of Sciences, and that much of the work that the National Research Council was doing on the requests coming into the academy, were engineering in nature. And so there were some engineers who were members of the Academy of Sciences, and they formed tha Academy of Engineering. They decided to do it under the same umbrella as the Academy of Sciences. There was a lot of opposition from the scientists. Some considered engineers to be nothing but money-grabbing opportunists. I came in on the third election, so there weren't many members of the Academy of Engineers when I came into it. I'm getting to be one of the oldest members in age as well as membership.

Swent: It's interesting that war seems to be the big impetus to interest in materials.

Boyd: Absolutely, because they govern you. The fuel questions are enormous, fueling the airplanes and the ships, and the tanks and the guns and all these things. That's a very big issue, a very big problem. Then, if you start shooting off ammunition, you're taking an awful lot of copper, and the communication wiring and things like this. So you soon find out that--and that was the reason that I got brought into the government as the director of the Bureau of Mines, because Secretary Krug, who had been chairman of the War Production Board after Nelson, this man up here [indicates photo on wall of Julius Krug] recognized how important materials were to the national defense. When he went over to the Interior Department as secretary he was naturally in command of the Bureau of Mines, Geological Survey, and the Public Lands Administration. He put the pressure on me to go into the Bureau of Mines. I knew him. We worked together, and he had a lot of confidence in me.

Chairman, Committee on Surface Mining and Reclamation of the National Academy of Sciences (COSMAR)

Boyd: Then, soon before I left Washington, a year or so before I left Washington, I was appointed as the chairman of the Committee on Surface Mining and Reclamation, which I've talked to you about before. That was even a more difficult problem than the commission was, because here we had the fight with the environmentalists. They told me that I would never get a report out.

I had on the committee the executive director of the Sierra Club, and I had mining engineers, and hydrologists, and population people, and all these, some top geographers and so forth, on this committee. And Ruth, by the way, was getting very ill at this time, so I didn't leave Washington very much. I had to have most of the meetings in D.C.--when I had to go to Chicago or something like that I would just go overnight. Then I had a nurse come and stay with her in the apartment. But I never stayed away more than one night at a time. And that not too often.

Swent: It must have been a very hard time for you.

Boyd: Nevertheless, George White on the staff of the research council was assigned to the committee. In fact, three people from the staff helped me with this one. They were quite convinced we would never get a report. I would never get the environmentalists and the mining groups [to agree].

They had a meeting one time in which one of the vice presidents of the mining companies was on the committee, and the director of the Sierra Club, Michael McCloskey, was on the committee. I could see we were going to have real trouble, so I went to Chicago. That was one time I did go away from home. I just sat and bumped their heads together. I made it pretty clear that it was extraordinarily important that we find a way to meet the legitimate requirements of the environmental questions and the requirements of industry to have a source of raw material. The result was that the report we put out was a unanimous report. No one believed we could do it. I'm more proud of that than almost anything I did.

Swent: You should be.

Boyd: I remember the first meeting we had, there was a mining engineer who was a friend of mine from Kennecott, and the Sierra Club man.

Swent: Not Brower?

Boyd: No, no, it was McCloskey. They had gotten Brower out of there. He is still very active but not the executive director.

Swent: Who was the Kennecott friend?

Boyd: The Kennecott man was Stan Michaelson. Stan jumped on Mike McCloskey. Michaelson says, "Are you going to be working for the Sierra Club, or are you going to be working as a member of this committee?"

I jumped on this thing immediately. I said, "If we can't here at this first meeting agree that we're going to be here as individuals and think only about the country as a whole, not about our specific organizations, including Kennecott or the Sierra Club, we're never going to get a report out of here. Now what do you want? We've been asked to get a report." I guess it was the warning of the staff that made me say that. After that I never had any real trouble, except that I could see it coming up in Chicago, so I made a point of going down there and getting into it. But I had some wonderful people on that committee. Two or three of them were members of the Academy of Engineering, particularly Joe Rosenbaum of the Bureau of Mines, who did more than his share of writing. They're the ones that put the report out.

So now where are we?

Swent: What happened to this report then? Did it have any results?

Boyd: This report was submitted to the Council of Environmental Quality, and our recommendation in there was that there was no need for any more environmental legislation in this field. The environmental legislation was there. If it was properly managed and handled it was all the legislation you need. The council agreed and the Carter administration agreed. They accepted the report. The commission accepted the report. It was submitted to the Congress, and even the people like Congressman Mo Udall, the chairman of the Mines and Metallurgy Committee, accepted it. There haven't been any attempts to go any farther on surface mining law, more legislation on surface mining, since then. It has been up to the Environmental Protection Agency and the states to use the existing legislation.

Swent: It was effective, then?

Boyd: Yes. That was the purpose, to see whether there was more legislation needed, and we convinced them there wasn't. And we had the agreement of the Sierra Club. That means the Sierra Club had to go work with the legislation they have now instead of getting more legislation. Such organizations are needed to help the enforcing of legislation on the job.

The Environmental Protection Agency always has to battle to protect the environment. In the early days they had an awful lot of environmentalists who really didn't understand the scientific aspects of the environment. They came up with all these kind of weird things, and they did a lot of damage to the mining industry.

Swent: Yes, indeed.

Boyd: But this man who resigned, and did a nice job for Nixon and for President Ronald Reagan, who asked him to come back as head of the department, William Ruckelshaus. He was in twice. He was the first administrator of EPA.

When Jerry Klaff and I started out getting the commission going, we knew what our problem would be. The EPA was just set up. We went over to see Ruckelshaus. He had barely gotten his feet under the table here. A new building was getting built and so forth. But we were able to get him to send people in and take part in the work of the committee. We didn't have confrontations with the environmental people. We would then sit down with them and see whether it was possible to do what they wanted to do for the environmental cause, and what damage it would do to the rest of the economy. You never know how much real influence you have over things in Washington. But you do have an influence. You affect people's minds, if you are forceful enough.

I told you that when the chairman of the Environmental Quality Commission, not Ruckelshaus, went and reported that I would be the chairman, the two senators who I had never met said, "You will get a good report." They must have read the commission's report. We got a report they could use, and did use. Even Mo Udall. Nothing's been done about it since, and didn't have to be done. You've got all the legislation you need.

Now, that was getting near the end.

Sewnt: When did you first get involved with environmental problems?

Boyd: While I was director of the Bureau of Mines, I was constantly reminding the mining industry they were faced with environmental questions. I used to make speeches about it all the time, and some of them I got to pay attention. They were making passes at it, but they didn't really realize this was going to be a serious matter.

It wasn't until I set up a unit in White Pine after I had left Kennecott that some people, particularly AMAX, began to take environmental things seriously, and they had a department. The man I had on my environmental work in White Pine went to AMAX later and is now vice president of AMAX and has a great deal to do with the good that AMAX has done in environmental matters.

Swent: What's his name?

Boyd: I can see his face. My retrieval system gets slower. He is a great friend of my third son. They live in Evergreen.

Swent: But he started with you at White Pine?

Boyd: I started him in that kind of business. He had his degree. He was my quality control officer. Then I turned over the environmental studies, and we had a very close working relationship with the state commissions. When we had any doubts about anything, we would sort of work with them from the very beginning; we wouldn't try to fight them. He was very good at that.

The result was that they used to complain our smelter would smoke. And so we would even close the smelter down when the wind conditions were such that it was putting fumes down into the forest. But whenever we saw any leaves around, we brought them in to see whether it was caused by the smelter or not.

Swent: That is, dead leaves?

Boyd: Yes, damaged leaves, but there are other things that could damage leaves besides sulfur smoke.

Swent: So it was mostly air pollution that you were concerned with?

Boyd: Well, there we had water pollution. After all, we were on the shores of one of the purest lakes in the world, Lake Superior. We were doing some work to find out how we could more cheaply separate the copper and the silver, and we tried cyanidation, and we worried about getting it in. So we had to be sure to get the cyanide out before there was any danger of it going into the water.

We never did set that up, but we were prepared to do that. We didn't use cyanide. We experimented with it, but we never actually put in a cyanidation circuit.

That was under Anton "Tony" Gaudin at MIT. He was our consultant in that one. But he was a consultant when I was at White Pine, too, when I was with Copper Range. I met him first when I was in Nevada, and he was doing some consulting work up in there, and we did some geophysical work on some of his consulting pages. I had known him before I went to Copper Range, and he had been a consultant, too, of Copper Range. I expect he was the one who introduced my name to the election in the National Academy of Engineering. I think Tony did that.

Swent: When did you leave Washington?

Boyd: I left there in 1979 to come out here. But just a year or so before I left, my man who had been the research director for Crucible Steel and been my research director up at White Pine, Walter Finlay, was made chairman of the committee to study the titanium situation. He had been working with titanium when with Crucible Steel. I knew a little about titanium because the Bureau of Mines actually brought titanium into commercial use, and there were companies set up to produce it. Without it we couldn't have these jet engines today.

Boyd: We couldn't have the kind of planes we have today. And although some things will replace the titanium, it's very difficult for a new material to get started, particularly when it's expensive. It cost about $7 a pound in 1980. It ain't cheap. We went around all over the country seeing the plants and talking to the new companies' executives.

They were trying to put a new industry into steady production in the face of attempts of other countries doing it by government. I was sitting down and arguing with them. I said, "Do you really want to do this by government action or do you want to work it out from the economic position?" Free enterprise. I talked a lot of them out of trying to do it from going in and getting legislation to give them support and supporting it that way.

Swent: Where is titanium produced?

Boyd: Well, titanium is a common metal in the earth's crust. It combines with oxygen, and once it's combined it's very hard to break it loose. It occurs in two minerals, rutile, which is TiO_2, and ilmenite, which is $FeTiO_3$, iron titanium oxide.

Kennecott had a big titanium mine in Quebec. I went up to visit it when I was vice president. Quebec Titanium Corporation had a smelter there which separated the iron from the titanium, and today they're doing very well. I don't know who's got it any more. When they sold Kennecott to the oil company, they spun that one off, and it's doing very well. They've got a name for it.

Swent: You haven't said anything on the tape about the Watergate incident. Do you want to say anything about that? You were living there at the time.

Boyd: Well, we were living in one of the three condominium units, Watergate South, and if I looked around the corner of my balcony I could see the office building in which the Democratic offices were in for the election.

Swent: I think you said that you knew both Haldeman and Ehrlichman.

Boyd: Well, I had met them, and I had talked to them on the telephone. They probably don't even remember me.

Swent: Did you know them at church? You said they were both Christian Scientists.

Boyd: No, I didn't know them there. As a matter of fact, I wasn't attending church at this time. I was too busy to do anything. Ruth had taken the boys back into a Divine Science Church, because she thought the doctors weren't supported by the Christian

Boyd: Scientists, which was quite contrary to the truth. The Christian Scientists have a great respect for the doctors, because some people can't see their way through to use Christian Science.

Swent: So she was not attending Christian Science church?

Boyd: No, she was a doctor's daughter. She would occasionally go with me. I've got a nice little story about it. I would love to sing, "Onward Christian Soldiers." One time there was an--Esquire came out with--you don't want this on the report.

Swent: Why not?

Boyd: Okay. They came out with a center spread in the middle of the magazine. It had two surpliced priests playing on the organ, and the caption said underneath, "Swing it, Reverend Hodgkis, swing it." So I took Ruth to church one night and they played "Onward Christian Soldiers."

I was singing in full voice, and she leaned over and she said, "Swing it, Reverend Hodgkis." I let out a squeak you could hear all over the church. I never took her there again. No, I'm just saying that. But she didn't like to go. She would go to the Divine Science church. And she took the boys when I went abroad.

She set up the Sunday school for them in Washington when they were in that church. That was the beginning of that Sunday school there. But when we got to Greenwich I started them back in the Christian Science Sunday school, but then they began going off to school and that didn't last very long. So none of the four are Scientists. But Clemmie's getting there.

Swent: So you didn't really have any personal interest in the Watergate incident? You didn't know the people well enough to be interested in it?

Boyd: No, I really didn't. Well, it was a shock to everybody. You probably knew more about it than I did. It took place in the building next door to me but I was pretty busy. I still think that a great many things that Nixon did, history will make him a good president. That little part of his character was a--

Swent: It was a flaw, wasn't it?

Boyd: We've all got flaws.

Swent: Sure. So the last president that you worked under was Carter?

Boyd: Well, I didn't work under Carter. I was working in the academies when Carter was president.

James Boyd, left, talked with T S Ary, incoming director of the U.S. Bureau of Mines, at the American Mining Congress convention in San Francisco, September, 1987. (This was the last photograph taken of Mr. Boyd.)

Photograph by Willard Convention Photo

Swent: Your reports were submitted to Carter.

Boyd: Yes, that's right. For instance, the Interior Department by this time when we were doing the surface mining thing was really no help to us. They had an assistant secretary of minerals that was a young lady. We got to be quite friendly, but she didn't know anything. She was practically useless, and we needed that help in these circumstances.

Swent: That's something that's changed in the field. You were working in an all-male field all of your career, weren't you?

Boyd: Pretty well.

Swent: And it's not that way so much now.

Boyd: I hired a lady geologist when I was with Kennecott, at least one. She went off to Brazil by herself into the jungles. The last I saw her she was in Grand Junction in the uranium field. But at least I never had any compunction about sending a lady to do men's work. I had only one lady geologist, but that never entered our minds anyway. There were a lot of lady geologists in the petroleum industry, for instance. But now of course, it's getting—Cal Tech is getting concerned because they're not getting women applicants to Cal Tech as much as they want. They've still only got about 10 or 15 percent women at Cal Tech, and they want more. Now they're going to try to find out a way how to attract them.

Swent: That's a switch, isn't it?

Boyd: Yes.

The Move to Carmel, California

Swent: Why did you choose to move to Carmel?

Boyd: Well, the year I graduated from college my mother and I came up through here as our last fling together. We went up over the coast and into Carmel, up to San Francisco and over to Tahoe, and then back down to Los Angeles. That was our last fling together. I said when I came in here--it was dirt roads, you know. Sand roads were rather common--"This is the place I want to live some day."

It took me fifty-three years to get here. But in the meantime Brown was out here, and he loved California, and Bruce had moved out to Los Angeles, working with Dasheveyor Company. Doug was in Denver. It didn't look like Ruth should go up to high altitudes. The boys made a thorough study of what you do in your old age, what kind of

Boyd: facility is best; we sold our apartment in Washington. What will be taking its place? They came to the conclusion Del Mesa was the best place to come to.

Swent: They researched it for you?

Boyd: Oh, yes.

Swent: That's interesting.

Boyd: But we decided they didn't want us to depend on going to the [Carmel Valley] Manor [retirement home] or someplace like that. They didn't like it. Being a Christian Scientist, if I ever felt a point beyond me I could go out to Arden Woods [Christian Science retirement home] in San Francisco; it was a lovely place. Clemmie and I spent two nights there, even though she wouldn't agree that she couldn't drink a cup of coffee.

So when I suggested this--and Bruce was living in the [Del Monte] forest--Linda, the lady that Bruce is getting a divorce from, had some connections with a church, with a minister, and he brought Ruth and me up to see it. So we agreed that was what we would do. We would buy a house here and move out here, and each of the families would have a unit in their living quarters. Doug has a bathroom and a bedroom on the garden level, next door to a big family room, so we would stay there. She had one of her strokes there when we were coming back from Australia. Bruce built a big room onto his house up here, which is where his to-be-ex-wife is living now. Brown has got it all planned out to add another room or unit. It would be a room big enough to live in and to sleep in and to have a bath.

##

[On November 24, 1987, James Boyd died following his customary daily swim at Del Mesa, Carmel.]

Transcribed by David Pollock, Kathleen Dixon and Chris Fenner
Final Typed by Shannon Page

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APPENDIX I

NATIONAL ACADEMY OF ENGINEERING 2101 CONSTITUTION AVENUE, N.W., WASHINGTON, D.C. 20418

Office of the President

March 29, 1988

Dear Mrs. Boyd,

It was with the deepest regret that I learned of your husband's death. As President of the National Academy of Engineering, I also wish to convey the condolences of all of our members.

I am sure that you are aware of the extremely high esteem in which Dr. Boyd was held by members of the scientific and engineering community. The loss of his talents in service to the Academy and to the nation is a great one. He will long be remembered by his friends and associates.

Sincerely,

Robert M. White
President
National Academy of Engineering

Mrs. Clemence Boyd
228 Del Mesa Carmel
Carmel, California 93921

PLATO MALOZEMOFF
200 PARK AVENUE
NEW YORK, N.Y. 10166

Feb 3, 1988

Dear Clemence:

I have been away from New York so much in the last three months that I missed the news of Jim's death. It came as a shock to me as he seemed to be in such good health when you and he had dinner with me in San Francisco.

Jim has always been one of my favorite friends. I knew him for so long it is hard to recall when I first met him. I think it was in Washington during the second world war. Our paths crossed so many times, with Jim being in various capacities, Bureau of Mines, Kennecott Copper Range, National Academy of Engineering, that I had ample opportunity to be with him and talk on multitude of subjects. I made a visit once to Copper Range mines and plants in Michigan at his invitation. That was especially memorable, not only for the exquisite courtesy and good will that Jim showered on me, but also for the enthusiasm with which he applied himself as the chief Executive of Copper Range.

A great friend, a thorough and

enthusiastic professional in the running industry, an extraordinary achiever, he has commanded respect and affection from a host of friends and associates. He was always very special to me, and I will miss him terribly. Perhaps you can communicate these sentiments to his sons, whom, unfortunately, I have not met, nor do I have their addresses.

Sincerely yours

A. Kalyanoff

APPENDIX II

November 12 1987

James Boyd
228 Del Mesa Carmel
Carmel, California 93921

Dear Jim:

I have been reading the 1976 AIME book on "Economics of the Mineral Industries," and I wonder if you would care to comment on this statement from the section on "Mineral Supply as a Stock," by David B. Brooks:

> For the most part, the final report of the U.S. National Commission on Materials Policy explicitly adopts the main lines of the USGS publication, thus following the precedent set by its predecessor, the Paley Commission. The Commission deserves some credit for so doing because there were many pressures, including a special report by the prestigious U.S. National Academy of Sciences--National Academy of Engineering, for a more cautious and conservative approach.

Since you were involved so intimately in this, I would like to have your idea on the "many pressures" and what "more cautious and conservative approach" means. You were on both sides of this: were you caught in the middle, or were you "pressuring" yourself, depending on what hat you were wearing? Also, it would be interesting, in light of subsequent developments, to hear what you think of the final report's validity. Should it have been more--or less--cautious?

If you would like to make these comments, and include them in your oral history, I think it would be very interesting. Certainly the NCMP report was prescient in emphasizing environmental issues.

We have already received requests from researchers to see our oral histories in the mining series, so we know that 1) we are doing something that is needed, and 2) we must push ahead to make the material available.

I hope you and Clemmie are both well. My best to you both.

Sincerely,

Lee

Eleanor Swent,
Project Director
Western Mining in the 20th Century

Mrs. Eleanor Swent
Project Director
Regional Oral History Office
The Bancroft Library
Univerity of California
Berkeley, CA. 94720

228 Del Mesa Carmel
Carmel, CA. 93921

November 23, 1987

Dear Lee:

Re: letter of 11/12/87
Economics of Mineral Industries.

I do not, nor do the Libraries in Carmel, have copies of the U.S. Prof. Paper 820, nor David B. Brooks' " Mineral Supply as a Stock", except the page you sent me. I am therefore at a loss as to what he meant by "many pressures" or " conservative approach".

The commission was appointed, before I had any knowledge of it, by President Nixon and was a Congressional body; that was why it was called the "National Commission on Materials Policy" The Commision was set up against the will of the White House. Nevertheless they did a good job of selecting its members. Jerome Klaff was nominated to be its chairman(because he was in the scrap metals business the Press called it the "Junk Commission"). Jerry was a very fine highly patriotic man dealing in the collection and refining of scrap alloy steels, a highly essential industry. Fred Seitz, the Pres. of Rockefeller University and past Pres. of the National Academy of Sciences, was a member as were Keith Caldwell, Prof at Indiana University a widely read author on enviromental questions, Hugh Liedtke, President of Pennzoil, now famous for his suit of billions of dollars against Texaco, and Lee Minturn for labor. The first Secretary of Commerce, Maurice Stans, was there for only one meeting, Peter Peterson whom Klaff and I visited in the White House, gave way to Frederick Dent, who signed the final report;, he never came to a meeting but was informally represented by James Owens, faithfully for the entire two years. Rogers Morton, the Secretary of Interior, was an offical member, but he became very ill, but was well enough to sign the final report. He was representead throughout by Hollis Dole, the Aassistant Secretary for Mineral Affairs.

The listed staff were as a whole competent in their fields and basically hard working. I will not try to describe them. With the Commissioners and individuals from virtually all walks of life dealing with materials, their origin, preparation and use were consulted. The staff dealt with all of the sources of information and expertise. The eight conferences with the Universities were well attended and useful.

2.

I have put all of this down to review your question about Conservatism and caution for I do not see that they apply, Considering all we went through and the vast amount of information and opinion. I think there are a hundred or so recommendations, and most of those that could be adopted without legislation have been adopted in the Executive Branch. The Congress has been influenced by it in several actions, but has really never faced up to the basic issues requiring legislation.

Of course there were all kinds of differences of opinion between staff and Commission members, from individuals asked for and giving advise. If we got into issues that were engaging the attention of the Excutive Branch we were so informed by the representive who regularly attended meetings and reviewed drafts. An analysis of all the written documents would in my opinion indicate that pressures from the outside were not great. We avoided getting deeply into questions on ocean resources as they were undergoing international negotiations at the time. The few difference in the report show how close we came to agreement, even though we come through with some new conceptions.

I would conclude that the volume of input precluded the domination of any pressures that other reports mentioned. And even the attempt by somebody to influence the report through the White House would be dealt with by Commissioner Liedtke as the report worked through the Commission and he would have to face the other Commissioners. In fact he did present some of his differences in objection to the report he wrote and is included in the report. I simply do no see where the report can be considered either radical or conservative, not reflecting untoward pressure.

Attached are the 100 or so pages from 374 to 475. I trust that I have left you enough informality to satisfy the need to shew somebody working off the cuff.

Most sincerely,

Jim

James Boyd

APPENDIX III

MINE SAFETY

A Proposal for Industry Action

By JAMES BOYD
President
Copper Range Co.

Table I. Injury-frequency rates at mines and quarries in the United States, 1932–62

	Metal mines[1]				Nonmetal mines[2]				Stone quarries				Sand and gravel operations[3]	
	Underground mines		Open-pit mines		Underground mines		Open-pit mines		Underground quarries		Open quarries			
Year	Fatal	Nonfatal	Fatal	Nonfatal	Fatal	Nonfatal	Fatal	Nonfatal	Fatal	Nonfatal	Fatal	Nonfatal	Fatal	Nonfatal
1932	1.74	74.89	0.38	19.29	0.68	71.60	—	44.56	0.58	34.28	0.48	57.91	—	—
1933	1.50	85.44	.13	20.27	.59	91.99	0.91	47.60	.32	50.33	1.24	63.67	—	—
1934	1.43	90.65	1.02	28.07	.81	78.73	.92	34.67	1.08	52.29	1.22	70.78	—	—
1935	1.37	83.41	.65	20.40	.88	66.82	.16	38.77	.29	56.33	.83	61.69	—	—
1936	1.38	96.70	.76	17.85	.45	57.18	.13	56.54	.97	57.38	.88	59.31	—	—
1937	1.25	100.38	.45	23.59	1.37	65.77	.29	49.30	1.56	59.71	.66	62.34	—	—
1938	1.27	93.71	.47	24.23	.20	49.52	.63	48.02	.49	48.65	1.21	60.93	—	—
1939	1.19	91.08	.68	24.00	1.09	60.96	.50	37.98	.42	48.01	.57	61.61	—	—
1940	1.02	70.95	.71	22.64	.57	44.91	1.04	40.95	.57	45.74	.98	57.75	—	—
1941	.98	71.60	.63	18.98	.86	54.60	.58	46.32	.95	47.65	.80	62.77	—	—
1942	1.03	64.32	.65	18.97	1.17	56.81	.36	44.06	.42	49.57	1.35	53.21	—	—
1943	1.05	64.77	.54	19.95	.90	58.28	.88	42.53	.77	47.54	.87	49.99	—	—
1944	.88	63.54	.48	19.74	.75	50.16	.47	49.08	.70	42.73	1.09	49.89	—	—
1945	.78	57.99	.33	16.44	.95	50.28	.11	39.79	.98	49.02	.73	47.65	—	—
1946	.80	65.62	.24	17.45	1.04	55.48	.86	43.80	.91	42.13	.49	44.60	—	—
1947	.96	63.50	.23	14.55	.58	48.77	.17	40.42	.94	41.08	.53	44.23	—	—
1948	.72	56.45	.39	15.57	.52	45.66	.57	36.93	.66	31.66	.64	41.56	—	—
1949	.58	57.99	.15	15.30	.51	45.79	.11	33.88	1.20	31.88	.59	40.08	—	—
1950	.73	57.37	.21	12.60	.59	50.46	.82	30.16	.34	29.02	.41	36.98	—	—
1951	.71	53.79	.29	15.29	.65	53.70	.39	27.63	.76	32.89	.39	37.94	—	—
1952	.96	53.17	.21	14.57	.37	48.11	.70	25.90	.87	26.75	.61	35.59	—	—
1953	.74	50.94	.29	14.10	.97	57.94	.20	22.40	.22	24.25	.32	35.73	—	—
1954	.75	49.40	.46	12.30	.26	39.23	.39	19.58	.30	26.42	.36	37.18	—	—
1955	.73	54.17	.25	14.04	.56	40.83	.70	30.89	.27	26.15	.55	38.83	—	—
1956	.84	50.42	.18	11.02	.30	37.38	.80	20.48	.26	30.46	.53	35.90	—	—
1957	.62	42.05	.23	8.49	.26	35.09	.21	20.04	.28	23.12	.44	41.55	0.59	29.50
1958	.86	41.19	.19	13.21	.74	43.52	.27	18.89	.57	30.60	.36	37.30	.27	18.37
1959	.95	42.41	.27	12.75	.22	42.96	.35	21.48	.16	28.34	.42	33.43	.19	19.68
1960	.96	45.40	.31	11.14	.63	46.60	.46	19.16	.18	37.96	.29	33.39	.26	20.04
1961	.72	55.19	.21	10.89	.64	36.88	.30	17.45	.38	28.45	.28	32.81	.21	17.84
1962[3, 4]	.79	44.32	.26	9.41	.74	42.55	.35	21.25	.91	34.81	.62	22.50	.71	21.16

[1] *For 1950–62, data on all surface operations for placer gold, exploration and development work not carried on in conjunction with mining operations, and some recovery of ore from mine tailing dumps; for 1932–49, gold placer hydraulicking operations are included in open-pits data and all other gold placer operations are included with underground mines.*

[2] *For 1962, excludes data on Frasch sulfur operations, salt and brine wells and solar evaporations which for 1958–61 are included with open-pits and for 1932–57, are included with surface workings associated with underground mines. For 1955–62 includes data on clay operations which were not compiled prior to 1955.*

[3] *Preliminary; from compilations of data received from producers by April 20, 1963.*

[4] *Other surface mining included with open-pit mines beginning in 1958.*

[5] *Not compiled prior to 1957.*

THE basic policy of the mining industry concerning mine safety is set forth in the resolution adopted at the American Mining Congress in Los Angeles in September. The text of this resolution appears elsewhere on this page. This is a positive program and was firmly endorsed by the industry at that time. It states clearly that the retention of mine safety responsibility at the local and state levels is essential to continually improving safety programs, when supplemented by consistent use of the cooperative research and training work done by the U. S. Bureau of Mines.

There has been a concerted movement to extend the enforcemnt authority of the U. S. Bureau of Mines to include metal and non-metal mines under provisions similar to those which now apply to coal mines. Many in the metal mining industry, however, believe that the granting of this authority has not fully accomplished its purpose of materially improving the national accident record in coal mining.

Downtrend in Mine Accidents Is Strong

Statistical information published by the U.S. Bureau of Mines (See Tables I and II) effectively demonstrates the existence of a strong downward trend in all mine accidents. While that of the metal and non-metal mining is somewhat more pronounced than that of coal mining, there is little to demonstrate that the introduction of Federal authority into the coal mines in 1952 significantly changed the trend. In my opinion, the improvements obtained were but a continuation of the pre-existing trend which could normally be attributed to improved safety standards being developed throughout the industry. It must be recalled,

Table II. Injury-frequency rates at coal mines in the United States, 1932–62

Year	Coal Mines			
	Underground mines		Strip mines[1]	
	Fatal	Nonfatal	Fatal	Nonfatal
1932	1.74	80.71	1.20	69.03
1933	1.35	74.43	.87	82.29
1934	1.45	76.80	.74	68.23
1935	1.52	77.63	1.37	68.86
1936	1.46	72.87	1.00	74.47
1937	1.57	72.83	.58	64.60
1938	1.60	71.81	1.31	57.22
1939	1.44	68.59	.66	54.32
1940	1.68	69.32	.94	52.67
1941	1.39	67.14	1.09	44.97
1942	1.47	66.61	.82	37.50
1943	1.43	63.72	.84	38.41
1944	1.23	60.40	.80	40.10
1945	1.16	61.17	.55	39.83
1946	1.15	65.30	.58	36.71
1947	1.27	62.96	.64	36.65
1948	1.15	61.95	.76	36.26
1949	.97	57.69	.39	31.55
1950	.94	54.77	.56	31.39
1951	1.19	52.77	.51	34.25
1952	.97	53.26	.55	28.06
1953	.96	49.38	.38	29.48
1954	1.10	47.98	.47	28.90
1955	1.06	48.10	.56	23.07
1956	1.11	48.88	.53	25.22
1957	1.29	49.10	.45	26.68
1958	1.24	47.73	.43	23.96
1959	1.10	44.81	.42	22.52
1960	1.28	45.96	.57	24.81
1961	1.32	48.05	.39	24.66
1962[2]	—	—	—	—

[1] *Includes auger mines for all years; anthracite dredges are included for 1936–61, whereas for 1932–35 dredges are included with underground mines; anthracite culm operations are included for 1943–61, whereas for 1932–42 culm operations are included with underground mines.*

[2] *Breakdown not available.*

MINE SAFETY

A resolution from the Declaration of Policy of the American Mining Congress

The health and safety of men working in mining operations is, and always will be, a major concern of every member of the industry.

As safety is a continuing daily duty in operations and planning, the industry through its own endeavors is best qualified and able to solve its safety problems. The management of a mining enterprise cannot abrogate its responsibility in accident prevention to outside agencies—government or otherwise. The function of encouraging greater awareness in the individual and providing the procedures and equipment to assure safe operations is an integral part of daily management responsibility. It is on this basis that safety performance will continue to improve in the years ahead.

The steady progress in improved accident prevention, as evidenced by the statistics of recent years, demonstrates the effectiveness of industrial programs which have resulted from carefully planned, conscientious and persevering efforts, and from education and research by all segments of the industry.

As knowledge and working methods improve, state and local codes or regulations and inspections will continue to help industry in meeting problems peculiar to each area. The industry will continue its active cooperation with these agencies.

The U.S. Bureau of Mines, through its excellent staff and its research work, continues to provide the backbone of improvement in safety technology. To put policing powers in its hands, as has been proposed, will duplicate activity of other agencies, reducing its technical effectiveness and leading to confusion and interference in management-employe-state cooperation, which is essential to optimum performance.

The industry appreciates the fine work of the U.S. Bureau of Mines in dissemination of scientific and statistical information on accident prevention, mine rescue training, first aid, technological improvements and similar activities on mine safety education. All of these programs contribute to the planning and administration of a sound industrial safety program. We commend the Bureau for these services, and state and local agencies for similar services.

however, that Federal authority over the coal mines is limited to prevention of major disasters, and that during this period the rapid mechanization of coal mining has steadily increased the disaster potential of these mines. Despite the increased potential, there has been a marked decline from previous experience, which is not reflected in these figures. (In the period 1942–51 there were 43 major disasters while in the period 1952–61 there were 12.) Nevertheless, the record in mines other than coal belies any necessity for imposing Federal authority on them.

No one can help but be impressed by the tremendous and significant strides toward accident-free operations by all responsible segments of the coal mining industry. The "moonlighters" draw public attention to operations where minimum safety standards are maintained. The dramatic headlines of an isolated accident overshadow the excellence of all immediate efforts. Nonetheless, these figures indicate that there still remains much to be done, for they show that in a working lifetime nine in a hundred coal miners and seven in a hundred underground metal miners can expect to be killed at work.

Plan of Action Advanced

Much of the entire industry's effort has been expended at the local level, where the most important results can be achieved. The significant flaw in Federal authority lies in a joint and divided responsibility for the success or failure of the safety program. This overlapping between state and Federal control often results in some areas of responsibility that belong to no one until an accident occurs. Management cannot abrogate its accountability for working conditions, but must take full charge of the entire program in its own mines. The old philosophy, "It's George's job, let George do it!" has left, in many instances, an unprotected segment of the operation.

The industry as a whole must therefore take positive action to strengthen its safety efforts in the metal and non-metal mines in order to satisfy its employes, the public and the Congress that mandatory Federal control in this field is neither desirable nor necessary. In this article, I suggest a plan of action to attain such improvements in mine safety administration.

States Should Retain Enforcement Powers

We must acknowledge that all mines do not live up to safety standards that are well recognized, and that there are no means by which the industry itself can enforce compliance; hence, some public authority with enforcement powers is necessary. We firmly believe that these powers should remain with the state or local authorities. Enlightened management recognizes that both the human and the economic considerations require strict attention to safety standards and by far the majority of mining administrations enforce within their own operations standards which are more stringent than can be feasibly set by law. There are only a few who do not live up to these standards and whose accident rates give rise to the clamor for Federal enforcement powers.

In order to achieve the goals laid down in our policy statement, we must work diligently to see that local laws are brought up to date—both in the mining states and in the counties where such regulations are limited to county authority. We must also see to it that the administrators of the laws and regulations are qualified by training and experience and have proper authority to enforce them fairly and firmly.

I should like to state at this point that when I was Director of the U. S. Bureau of Mines, and before the Korean War forced us to suspend such operations, we in the Bureau began a campaign to assist the states (particularly the coal mining areas) to up-date their laws and to improve the enforcement of them. We enlisted the aid of the local industries and the staff of the United Mineworkers' Union. Since that time continued efforts have up-dated laws in both coal and metal mining states, but on an uncoordinated basis. The U.S. Bureau of Mines staff, therefore, is in excellent position to aid in this activity.

Proposed Safety Program Outlined

The program which I suggest is as follows:

That (1) The president of the American Mining Congress appoint immediately a Mine Safety Committee which would have wide experience and geographic distribution.

(2) A secretary of this committee be appointed from the membership of the Washington staff of the American Mining Congress—full time, if necessary—to coordinate the work of this and local committees.

(3) This Mine Safety Committee collect and study all of the present mining codes and arrive at recommendations for those sections which have general application.

(4) Local Mining Associations or Safety Councils, where they exist, also establish Mine Safety Committees.

(5) Where mines or districts are not represented by local associations, the operator or operators in those districts set up ad hoc safety committees to carry on the same activities.

(6) The activities of the latter committees be reported monthly to the American Mining Congress in Washington so that the entire program may be coordinated and helpful suggestions obtained from other local associations.

(7) The local committees, with the assistance of local mine inspectors and the U.S. Bureau of Mines, review the state and county laws and regulations governing mine safety codes and selection of inspectors.

(8) The applicable laws be revised, where they do not now effectively serve the purpose.

(9) Legislative committees be contacted in order that changes may be introduced into the respective legislatures.

James Boyd began his professional career 36 years ago as field engineer with Radiore Co. From 1929 to 1941 he was on the faculty at Colorado School of Mines where he became associate professor and, later (1946–1947), dean of faculty. During World War II he served in the War Department, aiding in mobilization of the mining industry for the war and then helping direct the flow of raw materials to military production programs. He next served as the first director of the Industry Division of the Military Government in Germany. From 1947 to 1951, Boyd was director of the U. S. Bureau of Mines, and during part of that period headed the Defense Minerals Administration.

In 1951 Boyd returned to industry as exploration manager for Kennecott Copper Corp. From 1955 until 1960 he was vice president-exploration. He has been president of Copper Range Co. since early 1960.

(10) The respective state governors be called upon to enlist their support.

(11) The public continue to be informed of the efforts of the industry to improve its safety practices.

(12) Support be given to the strengthening of health and safety programs of the local, state and Federal Bureaus, and that a planned safety education and training program be developed, based on the services of the U.S. Bureau of Mines, for suggested use by individual companies.

Mandatory Inspection Would Erase Past Gains

The history of the coal mines inspection law indicates that the first step toward Federal control involved the legal right for the Federal inspectors to enter any coal mine at any time they desired. Most mining companies in the non-coal field have welcomed visits from the Federal inspectors over the years, for it is only through their on-the-spot examinations that the inspectors can become aware of problems which arise as mining techniques and processes change. The reports resulting from this voluntary system of investigations built a spirit of mutual understanding and formed the basis for the research programs of the Bureau, from which is evolved the technical knowledge required to understand and solve the safety problems. Were this placed on a mandatory basis, the gains made in the past would likely disappear.

Rather than be forced by law to permit these visits, it should be the policy of the industry as a whole, and companies individually, not only to accept these visits but to invite them. The calibre of the Federal inspectors has usually been high, and they provide the most efficient channel for the disseminating of broad safety knowledge.

On the rare occasion when a Federal inspector is denied access to a mine, he should be invited to report the occurrence to the local Safety Committee so that it can use its influence to overcome management objections. Usually such a refusal is based upon fear or ignorance. Those of us who invite Federal visits know that they are useful and helpful and that in our interest we should actively support the program through this type of procedure.

Mutual Cooperation Will Help All Concerned

"The price of freedom is eternal vigilance." If we are to combat effectively the steady pressures for Federal controls, here is one place where we can contribute our part toward a reversal of this trend. The present laws arose from the failure of industry to give concerted attention to a serious problem; today we are all fully enlightened. We complain about the encroachment of government in our daily affairs, but we rarely take action to prevent it. The best results for all of us can be obtained through close cooperation between industry and government at all levels. In this case, the staffs of the U.S. Bureau of Mines and the State Bureaus have the same goals as our own. Through mutual cooperation they can be aided in their activities and we ourselves can be helped by their knowledge and active assistance.

SINCE THIS ARTICLE WAS SUBMITTED FOR PUBLICATION, the Secretary of the Interior has submitted to Congress a report in two volumes as required by Public Law 87-300 (75 Stat. 649). The report is a result of a two-year study by a board established by the Secretary. Many of the data contained in the report were compiled by the United States Bureau of Mines at the direction of the board. Basic information was obtained from investigations, special studies and reports submitted by the industry and the states under the reporting procedures of the statute.

These data, where factual, lend support to the urgent need of the program outlined in the foregoing article. The conclusions, drawn by the Secretary, however, are directly opposed to the considered judgment of the mining industry, except insofar as they relate to the strengthening of the Bureau's training program. Little or no acknowledgment is made in this report of the significant and continuing safety progress by the industry.

The report's first recommendation is that the Secretary be authorized to promulgate safety and health codes. But safety problems are so local in character as to require codes reflecting local conditions. Federal codes could never hope to be so all-inclusive.

The second recommendation would designate those parts of the code which deal with more serious hazards and would authorize the Secretary to require compliance with these major provisions and empower his representatives to enter metal and non-metal mines for the purpose of inspecting and investigation. The board uses the coal industry as an example of the efficacy of this approach, without analyzing in any way the fact that the major hazards now covered by Federal statute in coal mines rarely occur in metal or non-metal mines. Little or no evidence has been presented to show that, where hazards are common to metal, non-metal and coal mines, they can be eliminated by Federal enforcement.

The third recommendation would require the industry to report employment and injury statistics despite the fact that voluntary reporting has, in the past, proven adequate. Production reports, now voluntarily made, have been considered highly satisfactory and there is no evidence presented that current health and safety reports are less valid or less effective.

The fourth recommendation is an agreement with the industry position that the safety educational programs of the Bureau of Mines should be supported with adequate funds.

APPENDIX IV

THE FUTURE OF EXPLORATION AND THE MINERAL INDUSTRIES

A Lecture Presented at Stanford University
January 14, 1963

By James Boyd*

Introduction

To assess the outlook for minerals, it is necessary to appraise the future of all manufacturing industries, for there is an intimate relationship. If we believe in the future growth of the United States and its allies in the Free World, we can look at specific industries with equanimity although not with complacence.

Prognostication—a Self-Defeating Art

To look into the future of any human endeavor, however, is a risky business, for any attempt to cogitate in public will in a small way affect the future itself. The conclusions reached by the President's Materials Policy Commission, which was appointed to look into the future of the nation's material resources, were highly controversial, as few people look at the future in the same light. Nevertheless, the very existence of the findings contained in its report (the so-called Paley Report, published in 1952) affected and still affect the decisions of those who control the destiny of the mineral industries. Consequently, the future for this study, which was a prediction, has already been altered by its influence.

Materials Industry Requires Long Planning Periods

Of all the units which compose the modern industrial complex, it is those which deal with minerals that must be planned furthest in advance. Planning and execution must be done as much as a hundred years ahead, as it may be this long before many production units now in production will be exhausted. Hence, we must look far into the future. Because "history is prologue," we must first start with a look at what has happened in the past, and what is going on now, to try to find some indication of what is likely to happen in the future. We are rarely very accurate when we look ahead even a year. Hence, we will be much more inaccurate when we look twenty-five years ahead. Nevertheless, plan we must! Fortunately, there are certain fairly predictable human events which have such a profound effect upon the trend of industrial development that they will cause more or less predictable industrial results in a broad sense.

Our subject here is primarily the future of exploration, which requires deeper in-

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sight than the production aspects of the industry. However, unless we take stock of the industry as a whole, we cannot see very clearly what is in store for exploration.

Mineral Industries Must Progress

Although the mineral industry as a whole is essential to civilized living, various segments within it are compelled to keep up with the times in order to survive. No enterprise can exist for long in our society unless it finds a place within the economic structure which is essential to the body as a whole. Unless it contributes to the well-being of the commonwealth, it has no right to exist. In fact, if it loses that essentiality, the forces of competition will soon destroy it.

Reserves Basic to Extractive Industries

Just as sources of relatively cheap raw materials are fundamental to an industrial society, so are ore or petroleum reserves the essential base to an extractive industry company. This statement is so fundamental as to be axiomatic. Although this principle is often expressed, it is nevertheless frequently forgotten. Unless an executive—who is the trustee of the savings of hundreds, perhaps thousands, of people—clearly understands this principle, he violates his trust. If he accepts the company's reserves as they were entrusted to him and fails to expend substantial energy—and funds—in the attempt to replace reserves as they are extracted, he will be, in essence, running a liquidating operation. The search for new reserves is therefore an integral part of any extractive enterprise, and the cost of it a proper charge against operating expenses. These costs must eventually be reflected in the price charged to the customers for the product.

History of Minerals

This is not the place to detail the history of mineral production. A few summary statements will suffice: the demand for virtually every mineral, once it has been established in commerce, has continued to rise over the years; it is perfectly true that demands made upon all the minerals have been notoriously fluctuative, but, with rare exceptions, the total demand for each shows a steady rise when the fluctuations are averaged out. Almost all materials newly introduced into commerce—dramatically illustrated by aluminum—show a steadily increasing *rate* of increase for many years. Few mineral raw materials, once established in commerce, disappear totally from the market; in fact, I can think of none that has; after they have become fully established in commerce, there is a tendency toward maturity in which growth tends to parallel general industrial growth and population increases. This occurs despite the encroachment of substitutes and changes in technology.

The Future

These are the salient trends in mineral history up to the present time. What about the future, as the future is what we are talking about today? From the viewpoint of those engaged in the extractive industries, the future is very bright. There are social, political and economic forces at work on a grand scale, that will, in the not too distant

future, place enormous demands on the extractive industries, unless interrupted by an international holocaust. However, the effect of these forces cannot be predicted exactly, as they are affected by many unpredictable variables.

Virtually all of the civilized nations today, either jointly through the United Nations or individually through programs of their own, are striving to improve the physical and economic well-being of the less privileged portions of their populations. The United States, with approximately 6 per cent of the world's population, still continues to consume nearly 40 per cent of the world's mineral supplies. The European community, although still far behind in per capita consumption, is rapidly overtaking the United States, and the Iron Curtain countries are making strenuous efforts to catch up. Almost every underdeveloped nation has ambitions in the same direction.

The Magnitude of Growth

Assuming that the consumption of raw materials is an approximate measure of the standard of living of a country, it is not difficult to calculate that proportionate increase which will be required to raise the rest of the Free World to our standard of living. Using the present ratio, it would require almost five times the amount of raw materials produced in the Free World today. To raise the average standard of living of the world to 10 per cent of that of the United States would require an increase in the mineral raw materials supply of at least half. To put it another way, every one per cent improvement in the average standard of living will require a five per cent increase in raw material production.

This concept has been developed by Mr. Ira Joralemon in a paper, "Forever Hungry," which was read to a gathering in San Francisco recently but which has not yet been published. Whereas he developed the figures material by material, I have, with his help, reduced them to a rough approximation of the ratios in total. In giving me permission to use them in this lecture, he pointed out that there are wide differences between commodities. In materials such as the fertilizers, which are totally consumed, the ratio of use between the well-to-do and the less fortunate nations would be about in proportion to the populations. This means that in these commodities an added consumption of roughly two and a half times their present rate would be required to bring them up to our standard. In the less destructible materials, such as copper and iron, the more prosperous nations have accumulated great quantities during the past half century. The accumulated material is in use and much of it returns to the system as scrap in twenty to thirty years. Therefore, to fill the "pipelines" and get sufficient material in use to produce our type of standard would require far greater ratios. This is not the place to develop the concept in full or to argue the details. Suffice it to say that whatever the accurate figures are, requirements for additional production are larger than most people can conceive.

It has taken over half a century, and billions of dollars invested, to bring our capacity for production—both here and abroad—to the present level. This brings into focus the task facing the extractive industries to meet the potential demands which will inevitably be generated by international efforts to improve the lot of the world's underprivileged population. This is the stated policy of the United States and the United Nations, and vast expenditures of energy and funds are being made to bring the policy to fruition. When we consider for a few moments the difficulty in finding new raw material supplies, and the enormous quantity of capital required to bring

them into production, we can get a glimpse of the enormity of the problem facing the extractive industries. This is a challenge to the entire mineral fraternity. Let me say only that we are talking not in terms of mere millions or billions of dollars, but of hundreds of billions in capital investment.

I have purposely painted this situation with a broad brush. It is easy to see what vast opportunities for economic and technical research are opened by these expectations. Each of the essential materials provides an excellent subject for economic research in order to define its future in more precise terms.

The Paradox of Current Surpluses

The paradox is that at the moment almost every mineral raw material is in ample supply for current needs. The world problems in minerals are currently those generated by surpluses—not shortages. I am quite sure that, in contemplating immediate problems, the total view has escaped the attention of those who would raise the standard of all of the millions in the underdeveloped nations overnight. To find the capital required to create mineral supplies for some of the dreams of the planners is beyond the realm of possibility, short of a hundred years. Mineral supplies are, however, only a small part of the picture. There are companion requirements necessary to bring about the desired results, which dwarf the mineral industries in their demands upon capital formation. Nevertheless, many people, organizations and nations are dedicating themselves to these humanitarian goals. They are bound to have some impact, and as they do, they will create resource problems in proportion to their success, which will erase our current difficulties.

Mineral Industries' Share of Future

To look into the future of the mineral industry and related exploration activities, it has been necessary to start with an appraisal of economic forces. This appraisal shows that if this country and the Free World are to "go forward with vigor," we in the mineral fraternity have a gigantic task to perform and should be able to face the future without fear that we shall run out of work to do. For everybody involved in the mineral industries, then, the long-range future is very bright, even if we face some difficult problems at this juncture. However, the future will remain bright for all mankind only if we do our share to help realize improvements in standards of living.

Exploration's Contribution

If this appraisal of the future is correct, then the burden falls first on the exploration fraternity. In most minerals the known and so far undeveloped reserves are insufficient to meet demands that would exceed our present capacity by more than a few percentage points. Certainly the search for, discovery and exploitation of new sources of supply are rapidly becoming urgent undertakings. This urgency may not be apparent to managers who today are struggling with surplus capacities and low metal prices. It is also unclear to Government officials who visualize the stockpiled materials as a gigantic burden on our Treasury, instead of the precious asset which they are. Large as these apparent surpluses seem to be, they pale into insignificance beside the demand which could arise from even a limited realization of current dreams for social progress in the world.

In light of these mental roadblocks, it is not surprising that managers have become discouraged by the high cost and relative unproductivity of exploration in recent years. Although we can point with some pride to many new discoveries, managers have authorized very heavy expenditures and observed too few immediate returns. Meagre though results from recent exploration appear to be in relation to the cost, nevertheless they have contributed to the current surpluses. Unfortunately, for many the cost of failure has been high and curtailments in appropriations have occurred. We should not, however, be discouraged by the present trend to curtail exploration activities; it will have to reverse itself, although it may take another period of shortages to stimulate the necessary interest.

We are all aware that most of the mines that produce today were discovered either accidentally or through the surface expressions of nearby areas of mineralization. In the past two decades, a few important discoveries have been made by more scientific means, but even these have been based on more or less primitive procedures. I say "primitive" because although they may have been the result of sophisticated thinking in the light of present knowledge, they are primitive in the light of what must be developed in the future.

For the immediate future, the increase in ore reserves will come most easily from the extension of known mines, or new orebodies in the immediate environment of those already discovered. Most of these new reserves can be found only by the application of much better structural and mineralogical knowledge than we possess today. There is, therefore, much room for research in the mineralogy of the environment of ore deposits and the structural or facies control of deposition. Some such research has been undertaken in recent years, but the mining profession has not yet learned from its brothers in the petroleum field that secrecy is one of the greatest deterrents to progress, so that too few of the results of the work have been released for publication. The limited work being done by the United States Geological Survey, in studying old or active mining districts, is producing invaluable data leading to solutions of the problems of this type of geology. Other data are being generated by the universities, research institutions and commercial companies. For those whose futures lie in this direction, there are innumerable avenues for research. For a partial list I refer you to the 1956 report of the National Science Foundation's Committee on Minerals Research.

Need for Fundamental Research

The tremendous increases in ore reserves required to meet future demand, however, must come from the discovery of entirely new mineralized areas. Today the search for these is being done mostly by the larger companies through extensive reconnaissance with geochemical surveys, airborne geophysics and photogeology, as guides to geological reasoning. These sciences, however, are in their infancy. Until we know more about the fundamental geological conditions which bring about the concentration of minerals into economic deposits, these expensive and broad reconnaissance methods will be only partly effective. Geological theorizing from massive data accumulated by such procedures can lead only to wasted effort if it is not accompanied by reconnaissance geology on the ground and greater knowledge of fundamental geologic processes on which to base interpretations.

Enough has been learned about the geologic environment of known mining dis-

tricts to teach us that the effects of geologic events reach far beyond the concentrations of economic minerals themselves. As we learn more of the nature of these subtle changes in the surrounding rocks, the better we will be able to detect the presence of heretofore unknown concentrations. Here again there are vast voids of ignorance which can be filled only by extensive research.

Computers

The application of systems engineering through the use of computers will be only as good as the basic knowledge which can be fed into the calculations, and such application of systems engineering to analysis of massive data is only partly understood. All of these data can be utilized only when the minds of many are applied to the problem. To accomplish as much as possible, the data must be made available to people with a broad spectrum of experience in order to get the most out of them.

Cost

All the above methods are extremely expensive. Only the wealthiest of companies or institutions can carry them out alone, and then only if their effort and financial support are courageous and large enough to stand the many failures which are inevitable before significant discoveries can be made. Smaller organizations will have to combine for effectiveness, and cooperate with public and private institutions. This problem changes some aspects of exploration. But the day of the moderate sized organization is by no means over. Such organizations have found major orebodies in recent years. Great orebodies may still be found at moderate cost by those with sufficient knowledge of ore occurrence as well as imagination and daring. Neither geophysical methods nor computers will ever make these qualities obsolete; they can only help.

Land Laws

The efforts of exploration groups will be hindered as long as archaic land laws continue to apply in areas where the basic geology is favorable for such efforts. Prospecting in our times is seriously handicapped by the present system of land ownership and administration. The fears of those in Government about the release of land to commercial development are as unfounded as those which prohibit the modernization of land laws. It is perfectly true that the resources of a country belong to its people, but it is only through specific groups of the people, who are trained and equipped to develop resources, that they can be made available for the use of the entire population. The benefits of the exploitation of resources can be made available to all the people by permitting such groups to operate freely. Therefore, further progress toward the full utilization of all lands is a matter of considerable urgency. The competing demands for the use of lands are resulting in extreme pressure today from each competing group to usurp large areas for its particular purposes. The wilderness preservationists, timber producers, grazing interests, water developers, recreation advocates, and even mining interests, instead of cooperating to solve their problems together, are taking them one by one to the Congress and insisting that the needs of their group are paramount.

It is easy to oversimplify the problem, it is true, but until the bodies politic under-

stand the underlying principles and overrule those who would prevent development out of fear that a few may make a profit, the discovery and development of new reserves will be most difficult. Hence, the future of our mineral supplies is almost as much a political problem as it is technical. The political side of the question cannot be ignored, as the future depends upon effective solutions. Until those who understand the problem enter the political arena in order to bring about a major change in the approach to land problems, the future of raw material supplies will be jeopardized. Because mineral raw materials are rarely consumed directly by the public, there remains a larger area of ignorance on the part of those in the seats of power than must be the case if these problems are to be solved.

New Types of Deposits

Even if we are able to find solutions to many of the basic geological, engineering and political questions, it is extremely doubtful if we shall be able to discover new deposits, of the type we have been used to working, fast enough to replace those being exhausted. If we are to be successful in bringing about economic improvement to great numbers of underprivileged people, the demands for raw materials will be beyond the reach of traditional mining methods or the presently exploited types and grades of ore deposits. Therefore, a part of the future of mineral exploitation must lie in directions foreign to our present training and experience.

Advance of Extractive Technology

Many of our present reserves are exploitable only because of technical advances in the fields of mining and metallurgy. A few years ago many of the deposits now mined could not be worked profitably with the machines and methods then available. The development of new mining methods is materially retarded by our lack of detailed knowledge of the nature of the materials and forces with which we have to deal. Mining methods and machines are evolved largely by trial and error. They are only minor improvements on those which have been in use for years, even centuries. It is surprising, even disturbing, to find the attention of operators engaged almost entirely in adapting the known to the problems at hand. Very little sophisticated, scientific thought is brought to bear on these problems. Yet, if the raw material requirements are to be met, radical improvements must be made toward the utilization of low-grade resources not now considered to be part of our reserves. The vistas in this field for physicists, other scientists and engineers are almost infinite. We may have to reach for sources of materials which are now beyond our present limited horizons—even to the seas, or to what today we call the "common rocks." I need not remind you that what we today call bauxite was clay to the last generation of aluminum producers; or that in fifty years the minimum grade of copper ore included in reserves has decreased from 1.2 per cent to .35 per cent, and at least one company is considering the mining and milling of 0.2 per cent copper ore—or one-sixth of the minimum that was used in computing copper reserves a generation ago.

Cooperation Between Scientists

All of these activities will require the combined efforts in team play of scientists in all fields, engineers of every discipline, sociologists and politicians. It is in the development of such cooperation that the future of raw materials lies.

To most of you with whom I am talking today, this vast problem of raw material supply may appear to be a high, impenetrable wall. To be successful in any endeavor men must broaden their horizons to include all the environments in which they work. Unless they do, they may expend their energies in ways which will have a limited application to the main problems.

To avoid this, it is essential to determine one's own inclinations in pure science, in the applied sciences, in engineering, politics, social studies, or management. Once an individual knows the field he wishes to follow, to be effective he must find the spot where he can make the greatest contribution and then tackle the problems with enthusiasm. If we all do this, the vastly complex question of the entire mineral supply, which we must face in the future, will resolve before the onslaught.

Conclusion

The future of the mineral industries in total, although appearing dark in some respects just now, is really bright. There is room in this field for far more people than enter it today, and the needs are complex and interesting enough to attract the highest calibre of all types of brains, if they can be made aware of the challenge.

I fully realize that what has been said here today poses more problems than have been answered. In the face of mineral surpluses and low prices, I have had the temerity to suggest that the world faces great shortages of raw material supplies in the not too distant future. We as Americans have set our feet on a course of leadership in world affairs, a major part of which is directed toward the improvement of the material welfare of millions of people. In our desire to prove the superiority of our political system of free individual choice within a welfare state, do we recognize that the lack of raw materials may cause us to fail? I think that at the moment we are in danger of permitting this to happen. Certainly the degree to which our objectives are achieved will be controlled in part by our ability to focus on and solve the questions I have touched upon today. The "Future of Exploration and the Mineral Industries" is inexorably bound to these political and social developments. Those faced with the planning of the future of the mineral industries must attempt to evaluate the probable degree of success of our political objectives. Because such an evaluation depends upon so many imponderables, it is difficult to be specific in detail. All of us engaged in any phase of the mineral field have a great challenge before us, but I for one am sure that we shall have some measure of success.

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